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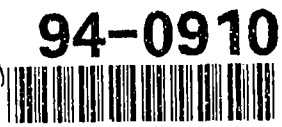

THESIS

US ARMY RECRUITING:
A CRITICAL ANALYSIS OF UNIT COSTING
AND THE INTRODUCTION OF A
RECRUITING BONUS INCENTIVE MODEL

by

Stephen R. Lyons
and
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December, 1993

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1. Provides an overview of US Army Recruiting.

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A CRITICAL ANALYSIS OF UNIT COSTING AND THE INTRODUCTION OF A RECRUITER BONUS INCENTIVE MODEL

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ABSTRACT

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I. INTRODUCTION

A. PREFACE

The U.S. Army's manpower procurement policies underwent major changes with the advent of the All Volunteer Force (AVF) in 1973. The Army, for the first time, was required to compete for labor in the free market. However, the Army faced a more restrictive labor pool than a typical business due to age, physical, and mental quality standards.

Quality and cost are key concerns in the Army's manpower requirements process. Today's soldier must possess a high school diploma, score in the top third on the Armed Services Vocational Aptitude Battery (ASVAB) and be physically and morally fit for duty. According to General Gordon R. Sullivan, the Army Chief of Staff, quality recruits are one of the six imperatives essential to maintaining a motivated and ready Army into the 21st century. General Sullivan backs his position with the following comments:

> Modern warfare requires soldiers capable of handling increasingly sophisticated, information-age weapons and support systems. Only quality young recruits provide the Army the type of soldiers who can mature into the leaders of progressively larger organizations. Quality people possessing the mental flexibility to adjust to highly diverse situations will allow the Army to meet the uncertain challenges the nation will face in the 21st century. Consequently, programs which enhance the Army's ability to attract and retain quality young men and women, must be protected and sustained. The ability of the volunteer Army to recruit and retain quality people is the

> *sine qua non* of a trained and ready Army. This requires the resources to advertise in major markets to attract young, intelligent, and pro-active American men and women. It also requires the resources to provide soldiers and their families with a quality of life that reinforces their desire to serve their nation. Resources spent in recruiting and retaining quality people create a lower discharge rate, lower training cost, and yield greater combat effectiveness. In the final analysis, it is the most cost-effective method to sustain a smaller Army. (Army Chief of Staff, pp. 23-24)

The mid-1980's brought an era of significant budget and accessions reductions that are still ongoing today. The Army's new challenge was how to do more with less and still maintain a quality fighting force. The budget reductions caused management to continuously seek ways to cut costs and improve efficiencies. Thus, the United States Army Recruiting Command (USAREC) implemented the unit cost concept as a management tool to control and reduce costs.

Our research began by comparing the annual unit costs for USAREC. Our first concern was to determine why the cost per recruit was not decreasing with the decrease in the accessions. Additionally, we could not readily determine a relationship between inputs (expenditures) and outputs (accessions).

Next, we examined USAREC's definition of unit cost and its subsequent calculation. The cost factor analysis

revealed minimal correlation between the big ten[1] macro cost elements and accessions. A large overhead infrastructure necessitated a large fixed cost and made up the bulk of input costs. Moreover, a significant portion of these costs occurred independent of USAREC's actions. Unit cost rose with the decrease in the accessions.

In addition, while researching these issues, we did discover a positive and direct relationship between command pressure and recruitment production results. It seemed that despite changes in discretionary recruitment expenditures, recruitment quota objectives were always met in the aggregate which implies potential inefficiencies. Our thesis developed an alternative bonus incentive system that help alleviates such potential inefficiencies.

Our thesis addresses two distinct issues that Army recruiting faces today; USAREC's implementation of the Department of Defense's (DoD) unit costing and a bonus incentive model to help alleviate potential inefficiencies and achieve true market potential.

B. OBJECTIVES AND SCOPE OF THESIS

Our four main objectives for our thesis are:

---

[1]The USAREC budget is broken into categories such as military pay, civilian pay, advertising and enlistment bonuses. These categories are referred to as the "big ten". Our research found that there is little statistical correlation between advertisement expenditures and recruitment production results (ref).

1. An overview of the Army recruiting process.

2. Discuss the unit cost per recruit formulation and its limitations.

3. Develop a bonus plan that provides an incentive for recruiters to seek and reveal their true market potential.

4. Have our thesis serve as input into a larger project involving the life cycle costs comparison of quality versus non-quality enlistees.

C. METHODOLOGY

Our methodology began with interviews with the USAREC staff located at Fort Knox, Kentucky. We interviewed the missioning, marketing, advertising and budget staffs.

Next, we collected the big ten cost figures and conducted statistical regression analysis to determine correlations between each of the big ten costs and accessions.

We then interviewed recruiters at a local recruiting station to compare their views to those of the USAREC staff.

Lastly, we developed an economic incentive model to facilitate the increase of recruiting efficiencies.

D. LIMITATIONS

The scope of our thesis is limited to analyzing the Regular Army initial entry recruiting process. We excluded discussion of the Army Reserves and specialty branches such

as the Medical Service Corps. Also, we only examined the flow of non-prior service recruits.

Additionally, our research was limited to examining current unit cost figures[2] and designing a recruiter bonus incentive model.[3]

E. ORGANIZATION OF REPORT

In Chapter II we provide an overview of the recruiting process from initial accession goal provided by the Deputy Chief of Staff for Personnel (DCSPER) through the impacts on recruiter production. We examine the supply, demand, and policy issues relating to quality requirements that affect today's recruiting efforts.

Chapter III is an in depth analysis of USAREC's implementation of the unit costing concept. We examine what constitutes the makeup of cost per accession and include an in-depth discussion of recruiting budgetary expenditures. Finally, we identify some of the limitations of using unit costing as a measure of effectiveness in the recruiting environment.

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[2]For a more detailed unit cost analysis, see W.R. Gates and K.L. Terasawa's Implementing Unit Costing: Efficiency in Translating Policy to Practice, undated.

[3]For a more detailed incentive model see K.L. Terasawa, The Bonus Incentive System Applied to Recruiting, 1993.

In Chapter IV we examine the current recruiting quota system and conduct simulations to quantify its potential inefficiencies. As an alternative to the quota system, we examine a bonus incentive model for recruiters. We demonstrate how the model provides incentives for each recruiter to maximize his true market potential, thereby surpassing quota levels. We show how the model enhances production and provides the headquarters with accurate market information to facilitate efficient allocation of resources.

Chapter V contains our summary, final conclusions and recommendations.

II. THE RECRUITING PROCESS

A. INTRODUCTION

In this chapter we will provide background as to the emergence of the All Volunteer Force (AVF), discuss supply and demand, study the impact of policy issues such as quality requirements, and describe how the recruiting system works. We will not, however, discuss the manpower requirements process.

B. BACKGROUND

According to a R.V.L. Cooper's study for the Defense Advanced Research Projects Agency:

> The advent of the All Volunteer Force in 1973 marked the beginning of a new era for the United States military, and indeed for American society in general. Without the pressure of the draft, the Armed Services were forced to rely on volunteers as their sole source of military manpower
>
> In January 1973, Secretary of Defense Melvin Laird announced that there would be no more draft calls, so the last regular induction occurred on December 29, 1972. Although the last serving draftee was not discharged until November 1974, the United States has for all practical purposes operated under an all-volunteer military since January 1973. (Cooper, pp. 1-2)

However, significant questions existed as to whether the Army could in fact attract the required new recruits to fill the ranks of a quality fighting force. (Cooper, p. 113)

The transition to the AVF occurred when the cost of a strong national defense had become an important concern. Manpower costs had escalated rapidly since the mid-1960's, both in absolute dollar amounts and as a share of the defense budget (Cooper, pp. 252-253). As a results, the defense budget which had once dominated federal expenditures, came under careful scrutiny by Congress and the public. While making up more than half of the Federal budget during the 1950's, the defense budget today accounts for less than a 20% of Federal expenditures; thereby making efficient use of scarce defense resources even more important.

The advent of the AVF, rapidly escalating manpower costs, and tight defense budgets served to make military manpower an ever increasing concern in defense planning and budgeting. Previously, the most important Department of Defense (DoD) issues were almost solely strategic and tactical in nature. Now they include manpower costs and management.

C. MANPOWER PROCUREMENT ISSUES

The Army expends large amounts of resources to ensure that the quantity and quality of recruits is sufficient to sustain force strength objectives. It is important to note that the "quantity and quality of enlistees is often a

reflection of Service polices as much or more so than a measure of actual supply and demand behavior" (Cooper, p.123). The requirement for quality enlistees is by its nature restrictive and therefore limits supply availability.

The three main elements of manpower procurement include: "demand for enlistees, supply of applicants, and the applicant screening process" (Cooper, p.123). Since supply and demand are fairly straight forward, the focus of this section will examine how the Army's manpower policies affect these elements.

1. Demand for Enlistees

Government demand for enlistees is a function of the strategic requirements process as opposed to achieving a free market equilibrium. Although in the short run the demand for enlistees can be inflexible to wages, we assume that in the long run the demand curve for recruits is a downward sloping function of first term labor costs (Cooper, pp. 123-124).

Figure 2-1 shows the demand for new recruits over time. In terms of raw numbers, the FY93 demand for enlistees was 77,583.

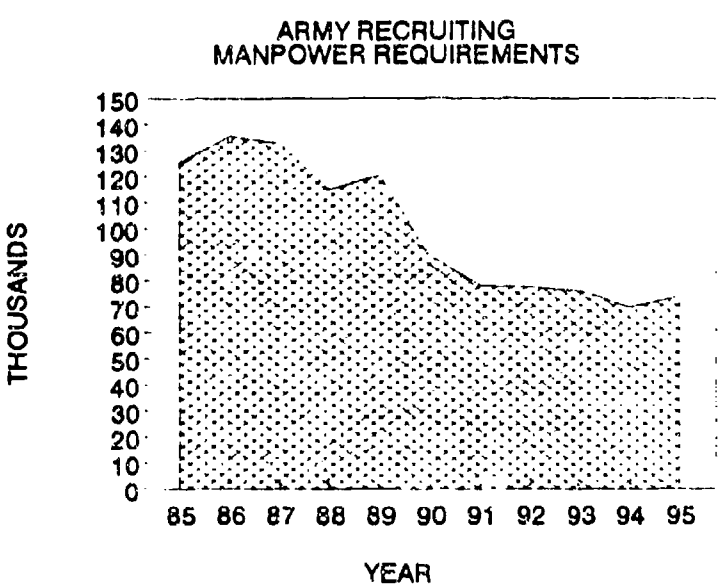

Figure 2-1

2. Supply of Applicants

Consistent with basic economic theory we assume that the supply curve of eligible 17-21 year old youths is an upward sloping function relative to wages (Cooper, p. 124). The supply of enlistees depends on a variety of factors. According to R.V.L. Cooper:

> It is convenient to categorize those factors that are expected to influence individuals; propensities to seek employment in the military into several major groups: 1) the tangible aspects of military employment; 2) the dissemination of information to potential recruits;3) the employment and earnings conditions in the civilian economy; 4) the population base from which the military must draw its recruits, and 5) individuals' "tastes" for military service (Cooper, p. 159).

In actual numbers, census information estimates that there are 8.632 million 17-21 year old youths in 1993 in the U.S. However, the prime market supply pool is reduced to six million when one extracts those institutionalized,

medically or morally unfit, serving in the military or possessing prior military service. When considering the effort to obtain quality recruits, the supply pool or prime market[4] of potential enlistees is reduced to 1.218 million (See Figure A-1, Appendix A).

Additionally, it is important to note that the Army categorizes the supply pool by breaking potential applicants into non-prior service (NPS) and prior service (PS). Non-prior service enlistees have never served in the military, whereas prior service enlistees have had some previous military experience. For the purposes of our report, we will not discuss the challenges associated with obtaining the correct NPS/PS force mix. Our discussions will focus on NPS enlistees since they are the majority of applicants. Figure 2-2 represents the estimated prime market for supply over the last decade.

---

[4] The prime market consists of males 17-21 years old; high school graduate; test score category (TSC) I-IIIA; non prior service (NPS); medically and morally qualified; and not already in the Service, in college, or otherwise institutionalized.

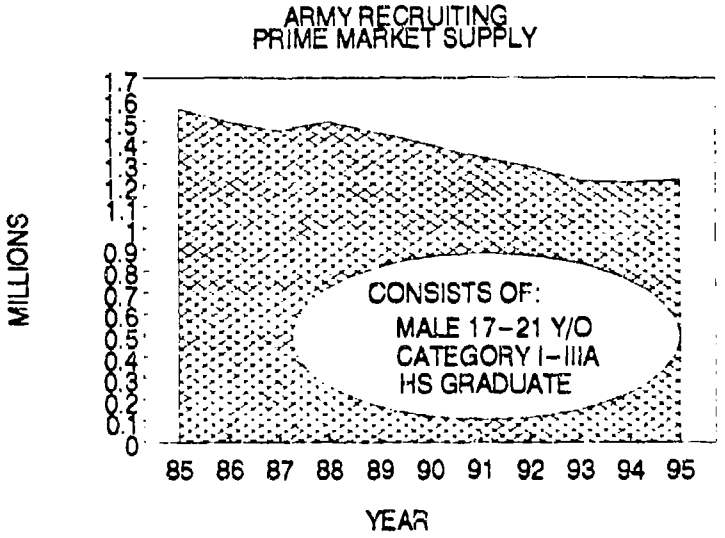

Figure 2-2

In general, the demand for quality recruits has decreased at a faster rate than the shrinking supply pool. For example, in FY93, a quality supply pool of 1.218 million was matched against a demand of only 77,563. Therefore, we have not experienced a demographic supply shortage relative to Army requirements. However, in a free market where youths are able to choose their best employment opportunity, the Army continues to face other competing entities for their recruits.

3. Applicant Screening Process

Supply is a function of both manpower procurement policy and the quantity of youth willing to serve. There has never been a shortage of youths desiring to serve in the Army, only a shortage of acceptable, quality applicants. In

this section we will discuss the reasons underlying the quality standards and the supply of quality applicants.

In general, quality refers to the aspects and attributes of a soldier that are deemed desirable and contribute to a productive, capable and motivated fighting force. The problem for analysts has always been finding a precise definition or ready measurement of quality. In the absence of a perfect measure, the result was to base quality on mental aptitude test scores and their educational levels. The Armed Services Vocational Aptitude Battery (ASVAB) is considered an indicator of performance while high school completion is a positive indicator of perseverance to complete his tour of duty. The Army attempts to ensure that at least 97% of enlistees are high school graduates.

The Army categorizes recruits based on their performance on the ASVAB. Below is an example of current quality categories expressed as ASVAB percentiles with 100% being the highest score.

TABLE 2-1

QUALITY CATEGORY	PERCENTILE
I	93-100
II	65-92
IIIA	50-64
IIIB	31-49
IVA	21-30
IVB	16-20
IVC	10-15
V	0-9

The Army places a floor (minimum), usually 67%, on obtaining categories I-IIIA. In addition, they place a ceiling (maximum), usually 2%, on accessing category IVA recruits. As a general rule, any category IV recruit accepted into the Army must be a high school graduate. Any applicant below category IVA are considered legally unacceptable. (Cooper, pp. 127-128)

According to R.V.L. Cooper's study, restricting the numbers of marginally acceptable enlistments stems from the following concerns:

1. Job performance.
2. Ability for occupational training.
3. Potential disciplinary or motivational problems.
4. Attrition rates.

Past studies conducted by USAREC indicate Category IV personnel are generally not as trainable as higher test score categories. Typically, non-high school graduates and lower test score categories have higher failure rates during formal training courses and are not as productive as the higher mental aptitude individuals. The failure to complete high school is a possible indicator of potential disciplinary or motivational problems. Additionally, USAREC has determined that high quality standards are consistent with lower attrition rates. Statistics support the findings that disciplinary problems in the Army have significantly declined since quality standards have improved. (Cooper, pp. 129-130)

Although an individual might meet the minimum acceptance criteria, this alone will not guarantee acceptance into the Army (Cooper, p. 127). Applicants falling below the IIIA mental category with a high school diploma are considered non-quality. The Army prefers high school graduates from the average and above average portions of the mental attitude spectrum only. Only when the supply of quality recruits has been exhausted will the Army accept non-quality recruits.

D. RECRUITING ORGANIZATIONS

The two key organizations that make up the Army recruiting effort are the United States Army Recruiting Command (USAREC) and the Military Entrance Processing Station (MEPS).

1. THE UNITED STATES ARMY RECRUITING COMMAND (USAREC)

The mission of USAREC, as stated by their headquarters at Ft Knox, Kentucky, is to "recruit with integrity, the highest quality individuals in sufficient quantity to meet the skill levels and structure of the active Army and the U.S. Army Reserve." The command's long term objectives are for the Army to become the "Service of Choice" and for Americans to compete for Army service. This year USAREC estimates it will recruit approximately 118,700 Regular Army and Army Reserve volunteers in more than 250 military occupational specialties (MOS) while meeting approximately 7,500 training class cycles. In addition, USAREC also has the responsibility to recruit for Army special needs such as officer candidate school, warrant officer flight training, Special Forces, technical warrant officers and Nurses. To accomplish this mission, USAREC is manned with over 10,000 uniformed and civilian personnel. Our report concerns the recruiting process of only Regular Army active duty accessions. (USAREC Command Briefing)

2. Military Entry Processing Stations (MEPS).

The MEP stations are DoD organizations regionally located in large urban areas with at least one Army representative. The MEP station's mission is to administer tests, physical exams, MOS assignment and process recruits. The Army representative is a guidance counselor who actually assigns the recruit his/her MOS. Up until this point, the recruiter was only "selling the Army" and does not guarantee any specific job. The costs to operate the MEP are not charged to USAREC and therefore do not appear in their unit cost figures. Figure A-2, Appendix A, shows the relationship between the recruiter and MEPS in the enlistment flow process.

E. APPLICANT TO ENLISTMENT PROCESS

According to USAREC, the applicant to enlistment process consists of:

1. Recruiting the potential enlistee.
2. Qualifying the recruit to meet established physical and mental capabilities relative to Army training standards and requirements.
3. Processing the recruit by writing his contract, establishing official records and delivering him to a reception station.

The enlistment process flow is illustrated in Figure A-3, Appendix A.

USAREC estimates that recruiters have to conduct nearly 750,000 appointments to achieve the 40,000 quality male accession mission for this fiscal year. This figure equates to 350 man-years for the 40,000 quality male accessions alone. It often takes a recruiter approximately 200 contacts, 19 scheduled appointments, and 14.2 actual appointments that results in testing 3.7 recruits with only 1.7 quality male graduates fully qualified to access. Figure A-4, Appendix A, represents a pictorial representation of a recruiters effort to obtain one quality contract.

Once recruited an applicant must go through the qualifying process. Qualifying refers to establishing physical and mental capabilities relative to Army training standards and requirements.

In the initial screening, the Army uses a series of criteria to eliminate individuals not expected to perform satisfactorily. This includes whether the individual is trainable, expected to perform his duties and will not pose significant disciplinary problems.

According to R.V.L. Cooper:

> The screening process consists of medical, moral, and mental examinations and evaluations. For example, the individual must pass a physical examination and meet moral fitness criteria,he must not, for instance, have any felony convictions. The medical and moral criteria differ from the mental criteria in that they are applied on a binary basis: the individual is deemed either fit or not

fit for service. The applicant is also tested for his mental aptitude and is classified in to one of five so called mental categories (I-V), with those in category I at the upper end of the mental spectrum (top 7%) and those in category V at the bottom of the spectrum (bottom 10%). Categories I and II are above average; category III is average; and category IV is below average, but legally acceptable. Category V individuals are not legally eligible to join the Services. (Cooper, pp. 126-127)

The next step concerns the decision to enlist. Not all qualified recruits choose to enlist. There are numerous reasons for not enlisting including peer or family pressures, better job offers or not obtaining the desired Army specialty. (Cooper, p. 127).

The final enlistment phase is processing. This is the phase when a recruit actually signs a contract to enter the Army and the recruiter is credited for meeting his quota. The MEPS creates their service records and delivers the recruit to the reception station at one of the various basic training installations. Once a recruit actually begins his basic training cycle he then becomes an accession.

F. DELAYED ENTRY PROGRAM (DEP) LOSS

Potential recruits may sign their enlistment contract and then enter the Delayed Entry Program for up to one year while waiting for their training seat to be made available. They may renege on their contract at any time while enrolled in the DEP without penalty.

The DEP was established for numerous reasons. The first and foremost reason is the time required to do background investigations. A potential recruit will sign his contract and be eligible for enlistment unless the background checks uncover disqualifying information such as felonies or a failed urinalysis test.

Secondly, DEP enables high school seniors to sign enlistment contracts and have employment waiting for them upon graduation. Additionally, DEP enables recruiters and trainers to better coordinate accessions with training seats. Before, a recruit was immediately brought onto active duty and was paid for idle time spent waiting for a seat in basic training.

However, the DEP is not without costs. If the DEP is considered an inventory, it experiences a 15% spoilage or loss rate. This rate tends to increase with higher quality recruits and the longer a recruit is enrolled in the program. Since DEP enrollment is penalty-free, many potential recruits, especially high quality ones, use their DEP time to job hunt for better opportunities. The longer they are enrolled, the more likely they will find better opportunities. The DEP loss causes variability in the recruiting system which leads to additional recruiting quotas to compensate for the 15% loss rate.

G. MEASURES OF EFFECTIVENESS

Recruiting effectiveness is measured by the ability to meet contract quotas on a monthly basis. A management indicator closely watched is called the write-rate. A write-rate is the number of contracts a recruiter produces per month. Due to DEP losses, the write-rate is not the same as accessions.

The USAREC headquarters sets quota goals for the brigades and the chain of command further breaks the quotas down to recruiter level. Recruiters are then considered successful based upon whether or not they reach their monthly quota. Accessions are also measured against a quota system. USAREC as a whole is measured on how well they achieve the quantity and quality marks of their accession mission.

III. UNIT COST ANALYSIS

A. INTRODUCTION

In this chapter we examine how USAREC calculates the unit cost of an Army recruit. Our goal is to provide information to be integrated into a larger research project. Our analysis is limited to identify sources of money, trends, and data formulation within a unit costing environment. In this respect, our thesis will not discuss the advantages and disadvantages of unit costing in terms of economic efficiency. Instead we will demonstrate how unit cost figures are derived and illustrate various limitations for using them as a basis for decision making.

B. BACKGROUND

As the defense budget decreased, the Department of Defense (DoD) received increasing pressure to improve efficiency, productivity and quality while providing better cost dat to facilitate the downsizing of the military.

To help accomplish the downsizing goals, Donald Shycoff, in his former position as Deputy Comptroller of DoD, introduced a "cost per unit system" also referred to as unit

costing or average total cost. According to a Defense Logistic Agency (DLA) document:

> Unit costing is nothing more than a concept that all of the costs incurred at an activity should find their way into some output measure. The idea is to use a "business type" accounting or financial system approach. Private businesses must recover all of their costs through the pricing mechanism or they will soon be out of business... The goal is to have each product or output bear as accurate a cost as possible, so that as the products or outputs fluctuate, the revenue and costs will remain in balance" (Seiden, p.24)

The definition of unit cost is total input (expenditures) divided by total output (accessions). Therefore it is critical to identify a meaningful output measure. The Recruiting Command's output measure, as directed by DCSPER, is accessions. Next, the Service organization must identify all the costs involved in producing that output. Often, the organization that has the lowest unit cost receives the largest share of resources, which in our case equates to budget dollars.

The potential uses of unit costing according to its proponents include:

1. A management tool to improve operations and gain cost consciousness.
2. A resource tool to support and evaluate the budget.
3. A productivity tool to assess and reward performance.

The potential unit cost benefits include:

1. Cost visibility, a method to identify the source and how to control costs.
2. Flexibility, the ability to make trade-off decisions to maximize scarce resources.
3. Responsibility, transfer cost ownership to the lowest level.
4. Accountability, link performance to cost management.

In this chapter, we will address how USAREC calculates cost per accessions figures, identify the money sources, discuss the correlation of expenditures with accessions and identify limitations to the unit costing approach due to its over simplistic nature.

C. UNIT COSTING AT USAREC

The Army, more so than the other Services, is a labor intensive organization. As a result large amount of money is spent in the area of manpower procurement. For instance, in FY93, $546 million were spent on the Army's recruiting effort. This equates to over $7,000 per recruit under the unit costing concept. This cost does not account for any training, but only the cost incurred to persuade one applicant to enlist. In order to calculate the unit costs we must first identify inputs and outputs.

The output measure for USAREC is the number of accessions as dictated by DCSPER. The inputs are the sum of all expenditures on recruiting efforts. USAREC breaks out

these expenditures into several areas known as the big ten accounts which we will discuss in this chapter. The cost per accession or unit cost is calculated by dividing all expenditures by the number of accessions for the year. For example, in FY93 total expenditures equaled $559.217 million and accessions equaled 77,563. Therefore the cost per accession is calculated by dividing $559.217 million by 77,563 to obtain a cost per accession of $7,210.

Based on the unit cost method, Figure 3-1 shows the increasing trend in real dollars of cost per accession over time. Since 1980, we have seen an increase of 75% in real terms of the cost per accession. To many people, this increase seems alarming. However, to get a true understanding of just how we should interpret this increase, we found it necessary to analyze the underlying basis of the calculations.

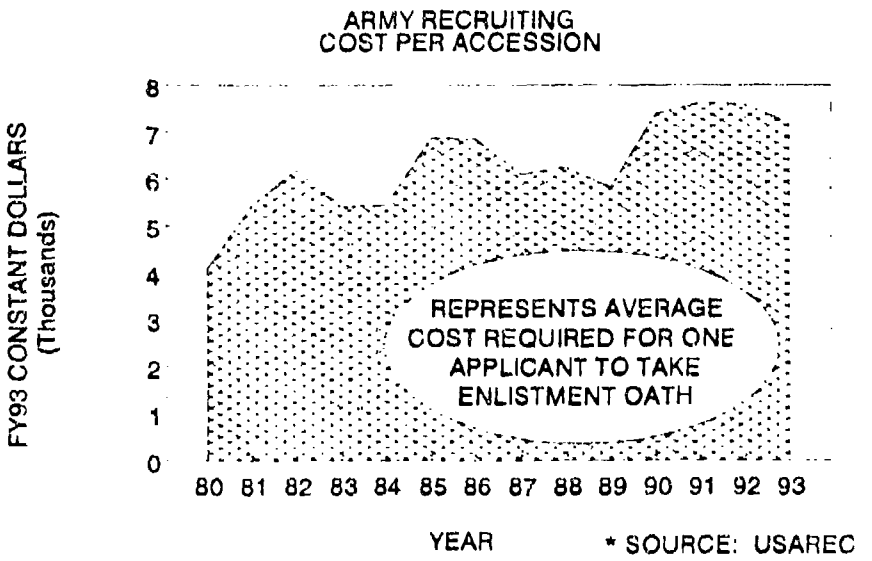

Figure 3-1

D. DATA ANALYSIS

The average cost of an Army recruit is $7,210 in 1993 as compared with $4,094 in 1980. Since demand for enlistees is declining, it is reasonable to assume that the cost per recruit should also decline. However, the effect of declining enlistees on the unit cost is more complicated and actually depends on the nature of the cost function.

1. Controlling Accessions

The denominator, accessions, is a function of force requirements as generated by the National Military Strategy Document, Defense Planning Guidance, and several other planning and programming documents. Since accessions are not driven by the market as in the private sector we must

accept manpower requirements as given. Due to the Army downsizing in recent years, the number of required accessions has significantly declined. The Army projects the number of accessions to reach a steady state of approximately 80,000 per year by the mid-nineties as compared with 173,188 accessions in 1980. Figure 3-2 shows the decreasing trend of manpower requirements.

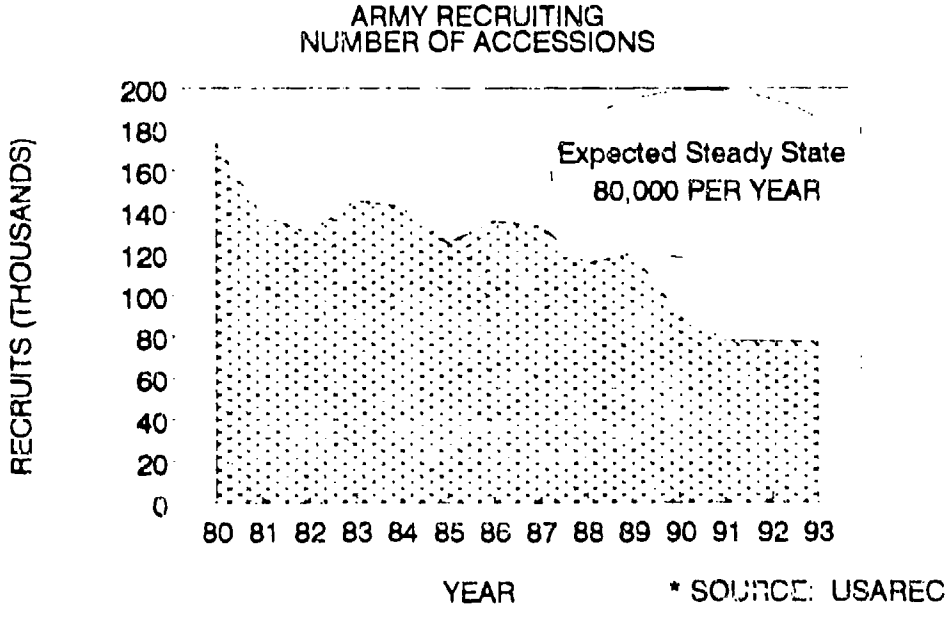

Figure 3-2

2. Controlling Recruiting Expenditures

Analyzing expenditures is much more complicated. As shown in Figure 3-3, there has been a real decline in aggregate recruiting expenditures. However, expenditures decreased at a slower rate than accessions. The result has

been a general increasing trend in unit cost. We will now provide a summary of recruiting expenditures.

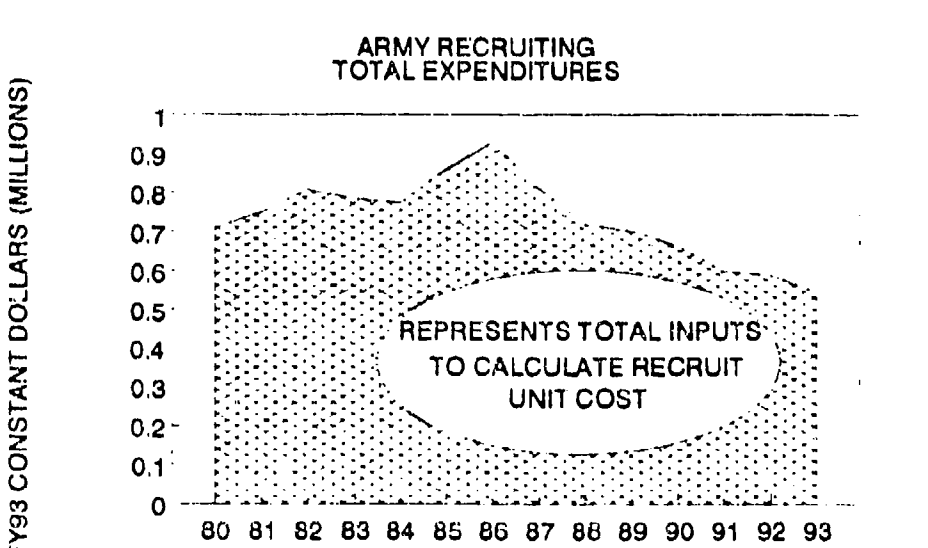

Figure 3-3

Recruiting expenditures as shown in Figure 3-4 are almost evenly divided between two congressional appropriations. The first being Military Personnel Army (MPA) and the second being Operations and Maintenance Army (OMA). ***Of all the money expended on recruiting, USAREC only controls over approximately half of the OMA appropriated monies (30% of total recruiting costs). The remaining OMA expenditures and all the MPA monies are spent by agencies other than USAREC and the costs are then allocated to USAREC for unit cost purposes.*** This creates serious difficulty in efficient management of recruiting activities. Even if

USAREC acts most efficiently in the given situation, its impact on total efficiency is limited and at best suboptimal.

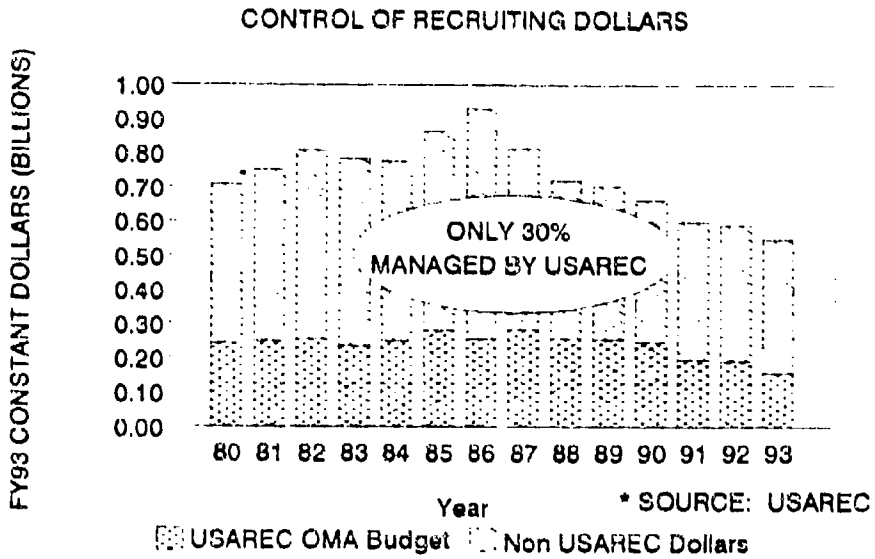

Figure 3-4

We have broken recruiting expenditures three categories; Military Personnel Army (MPA) acc Operations and Maintenance Army (OMA1) account controlled by USAREC, and the OMA2 accounts co d by USAREC. Figure B-1, in Appendix B, provides a br ut of expenditures used to calculate recruiting cost per accessions figures. The total expenditures among all accounts on recruiting for FY93 were $559.2 million.

a. The Military Personnel Army (MPA) Accounts

The MPA expenditures account for 57% of FY93 total recruiting expenditures. These expenditures consist of three separate accounts: the Army College Fund, enlistment bonuses, and military pay.

(1) The Army College Fund. At $8.6 million for FY93, this account finances the Army College Fund for USAREC personnel. Fund members allot up to $100 from their monthly pay which the Army then matches two to one. It is possible for the fund to be self sustaining as long as the cumulative contributions exceeds that of withdrawals which will result in zero account balances as shown in some of the past years. Currently, the fund only represents 2% of USAREC's expenditures. However, the fund's costs are anticipated to grow in future years comprising up to 10% of future budgets (See Figure B-2 in Appendix B).

(2) Enlistment Bonus. At $11.1 million for FY93, the enlistment bonuses are used by the guidance counselors to attract potential recruits for hard to fill MOS's. However, the amount is based on the MOS and contracted enlistment years as set by DA Headquarters. The guidance counselor determines whether or not to offer the bonus to the potential recruit. If the bonus is used, the full payment amount as established by DA must be given to

the recruit. Bonuses change continuously based on requirements and is currently about 2% of expenditures and projected to remain at the same level in the future. (See Figure B-3 in Appendix B).

(3) Military Pay. By far the largest outlay at $299.2 million, military pay comprised 54% of the FY93 expenditures and is expected to level off to about 45% in future expenditures. ***The figure used does not reflect actual personnel expenses, but rather an average or composite rate. Military pay allocations are based on USAREC's Table of Distribution and Allowances (TDA) which authorizes the quantity of personnel. This quantity is then multiplied by composite rates established by the DoD.*** The rates are updated annually with one figure for officers and one for enlisted personnel. For example, in FY93 the total number of authorized officers was multiplied by $70,565 and the total number of enlistees by $32,121 for a total of $292,351,000 charged against USAREC's expenditures.

Since the costs are based on TDA authorizations and not actual strength, the level of allocation to cost per recruit does not account for unfilled positions or excess USAREC personnel. Therefore changes in military strength levels have no impact on unit cost in the absence of a TDA revision.

Moreover, an organization such as USAREC is comprised mostly of senior enlisted personnel (the recruiters) and senior staff officers. As a result, the use of composite pay may underestimate USAREC's true military personnel cost as much as 20%[5]. Since the MPA account is half of the recruiting expenditures, any discrepancies in the actual military pay costs will have significant impact on USAREC's unit cost.

This creates many potential difficulties in properly interpreting the changes in unit costs over time as well as between Services. For example, even if no changes occur in USAREC's TDA, changes in the Army wide profile will significantly influence the USAREC's unit cost.

When comparing USAREC's unit cost to other activities or Services the composite pay discrepancies must be taken into account to develop a true picture of the costs associated with recruiting (See Figure B-4, Appendix B).

b. Operations and Maintenance Army Accounts (OMA1)

The OMA1 are not under USAREC's spending discretion and include communications, Keystone, facilities,

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[5] The military pay account is calculated by taking one composite figure for officers ($74,356 for FY93) and one for enlisted ($32,673 for FY93) and multiplying them by the TDA authorizations for total officers and total enlisted personnel. This figure can be up to 20% less than if each individual rank is multiplied by the composite for that rank. We only considered TDA authorizations. Depending upon over and under filled slots, the military pay figure can vary even more.

and VEAP accounts which represented 16% of FY 93's total recruiting expenditures. Since USAREC does not manage these costs they also can not control the impact of these accounts have on cost per recruit.

(1) Keystone (Computer link between TRADOC and USAREC). At $9.5 million for FY93, the Keystone account represents less than 2% of the FY 93 expenditures and pays for the computer link with the Training and Doctrine Command (TRADOC). This link provides data concerning available training seats for recruits at the various Army training activities, thereby impacting on the monthly mission requirements and the amount of time the recruit spends in the DEP. The Keystone account is expected to remain stable into the near future (See Figure B-5, Appendix B).

(2) Facilities. The Army Corps of Engineers is responsible for leasing civilian facilities for the DoD recruiting activities. The total DoD facilities expenditure is sub-divided to allow for a portion to be allocated to each Service. The Army's portion represents 36% of the overall DoD facilities costs. Since they are charged a flat rate, even if USAREC withdraws recruiters from a station it will not affect unit cost unless all Services withdraw recruiters allowing for facility closure. This means that even if efficiencies are gained by withdrawing Army recruiters it would not be reflected in unit cost management

indicators. At $36.2 million for FY93, facilities comprised 7% of the FY93 expenditures and is expected to remain approximately at the same level in future years (See Figure B-6, Appendix B).

(3) Veterans Education Assistance Program (VEAP). Similar to the Army College Fund, this fund provides soldiers with money for continuing their education. The VEAP was first charged to the OMA account in FY93. The VEAP costs were $29.7 million for FY93 and were less than 6% of the FY 93 expenditures and is expected to decrease in future years.

c. Operations and Maintenance Army (OMA2) Accounts

The OMA2 accounts are under the direct spending discretion of USAREC and includes civilian pay, advertising, recruiter support, training, and communications. These accounts are the ones most effected when USAREC is required to reduce their operating budget. In FY93 total USAREC controlled money amounted to $163.7 million, only 30% of total dollar expenditures for recruiting.

(1) Civilian Pay. At $33.4 million for FY93, civilian pay was about 6% of the FY93 recruiting expenditures. Civilian Pay has remained relatively stable over the past ten years and is projected to remain at current levels into the future (See Figure B-7, Appendix B).

(2) Advertising. At $32.8 million for FY93, advertising is usually the hardest hit under budget reductions since it is easily accessible to budget cutters. In addition, it is often difficult to measure advertising effectiveness directly in terms of accessions. However, establishing a relationship between advertising and youth propensity to enlist might be possible. Since propensity to enlist is only one of several factors that effect the supply of recruits, it is difficult to quantify the relationship between advertising expenditures and accessions. Advertising has been greatly reduced in the past few years. It is projected to be roughly 5% of future expenditures (See Figure B-8, Appendix B).

(3) Recruiter Support. At $73.8 million for FY93, these funds support the day to day operations of the recruiting stations. Recruiter support currently is less than 15% of the expenditures and is projected to slightly decrease in future (See Figure B-9, Appendix B).

(4) Training. Accounting for $5.1 million in FY93, these funds cover the costs incurred to train recruiters in both mandatory soldier skills and specialized schools designed for recruiters[6]. Over the past ten years training costs have been less than 1% of the FY93

[6]The costs for operating the Recruiter Training school at Fort Benjamin Harrison are charged against TRADOC and not USAREC.

expenditures and is projected to decrease in the future (See Figure B-10, Appendix B).

(5) Communications. At $18.7 million for FY93, these funds pay for telephone and other communication costs. Communications has stabilized to under 4% of expenditures and expected to remain at that level in the future (See Figure B-11, Appendix B).

It should be noted that since active duty Army recruiting is co-located with recruiting for the Army Reserves some overhead costs are shared and cannot be directly allocated to the different accessions. Additionally, even though the costs are minimal, initial entry recruit costs also reflect the costs for recruiting Nurses and Warrant Officers. These issues somewhat complicate the identification of the actual cost per basic active duty Army enlistees.

This section has provided a summary description of the expenditures incorporated into calculating the cost per accession. We have seen a general decrease in recruiting expenditures in real terms during recent years and foresee additional future reductions, to include fixed costs, as the Army approaches a steady state accessions level. In addition, we recognized that when overhead costs do decrease, they generally lag behind decreases in accessions until such a time that the Army downsizing reaches the

expected steady state. We will now discuss some of the limitations associated with unit cost measures.

3. Limitations of Unit Costing

In our analysis we found several limitations of using unit costing as a management tool. We will discuss unit cost's use as a budget allocation tool, it's lack of incentive to make efficient cuts and the accuracy of the data used.

a. Resource Allocation using Unit Cost

First, as we stated, DoD unit costing methods implicitly assumes that all costs as variable with accessions. Moreover, they seem to adopt a constant marginal cost assumption and equality of average and marginal cost as opposed to the U-shaped average cost curve widely accepted in the private sector.

As a result, DoD ignores the real possibility of divergence between marginal and unit cost. In our analysis we found that many of the costs associated with recruiting are fixed. Significant overhead costs will be incurred regardless of changing accession levels, especially in the short run. Of the big ten cost categories, for example, only the recruits' meals, lodging and travel have any statistical correlation with accessions.

This is a significant point since without the equality of unit cost and marginal cost, implementation of

unit cost will not achieve the intended efficiency improvement nor stability of the budgetary process. Under the unit cost concept, the current year's accessions multiplied by the previous year's cost per accession should be the current year's allocation of funds. Figure 3-5, however, shows why such a funding procedure is not likely to lead to a stable budgetary process in the presence of fixed cost.

Any efficient organization, faced with a changing production level, will adjust its overhead structure. For example, when the expected target accession level declines an efficient organization will reduce the overhead structure and reduce its fixed cost (FC).

Figure 3-5 shows two total cost curves associated with the different expected target accession level. Curve Y with a higher fixed cost but lower variable cost is more cost-effective for accession level higher than Q*. And the converse holds for Curve X.

Recruiting Total Cost Curves

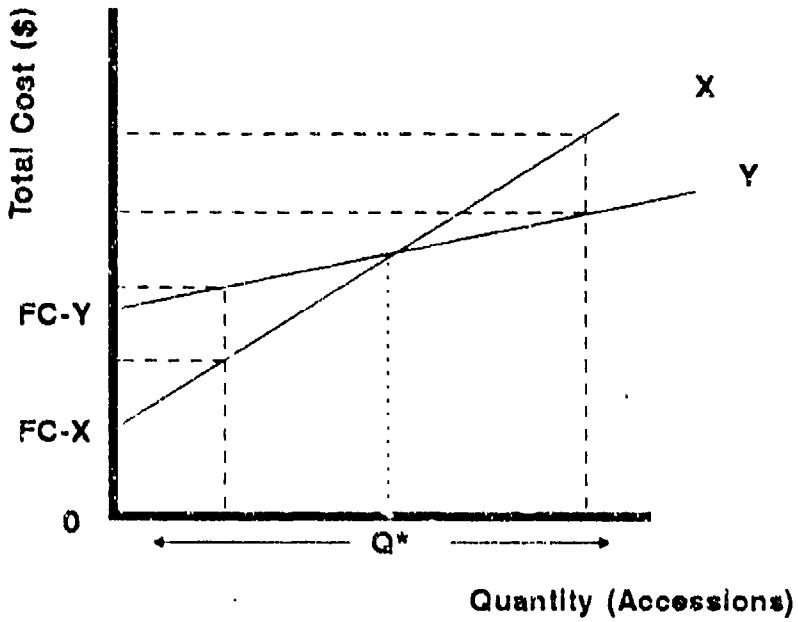


Figure 3-5

Figure 3-6 shows the same situation using unit-cost curves instead of total cost curves. For illustration, assume that USAREC has built the overhead structure appropriate for target accession levels greater than 120,000 per year, i.e. operating with a cost curve such as Y. If the accession level was 120,000/year, then the unit cost is around $5,700. With the declined accession level of 70,000/year, the unit cost could climb to $10,000 if USAREC did not adjust optimally. However, even with an efficient adjustment (i.e. adoption of reduced overhead structure and use of the X curve instead of the Y), the unit cost in this example rises to $7,000. If the budgeteer does not recognize the presence of fixed cost and budgets

$3,990,000 instead of $4,900,000, then the likely outcome would be either a "cost over-run" or failure to meet the accession target. Neither outcome would enhance the effort to improve efficiency.

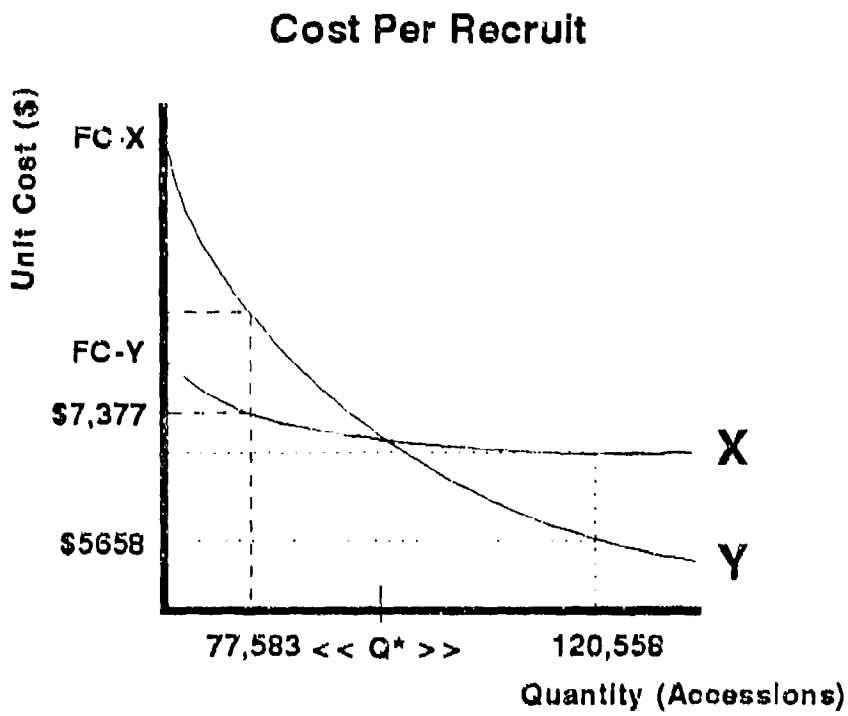


Figure 3-6

b. Lack of Incentives to Make Efficient Cuts

One of the unit costing objectives was to give management budgetary discretion that allows them to reduce costs while optimizing the resource mix to meet mission goals. This goal will only be achieved if management is given the responsibility and flexibility to make decisions affecting all resource allocations. However, although USAREC is held accountable for reducing the cost per

recruit, Figure 3-4 showed that the command only controls 30% of recruiting expenditures. This situation has the potential to create both incentive and efficiency problems in the area of controlling costs.

For example, military pay makes up over half of the recruiting expenditures. However, any efficient reductions in manpower will not be reflected in lower unit costs since the military pay allocation is based on USAREC's TDA and composite rates. Thus, there is no incentive to reduce personnel since USAREC will still be charged for them. In fact, the opposite is true. Managers will be tempted to overfill TDA authorizations since they will not be charged for excess personnel.

Another example that offers little incentives for reducing costs is the facilities expenditures. The Armed Services' recruiting activities are often co-located in the same facilities. The Army is charged a flat 36% of the DoD facility budget. A decision to withdraw Army recruiters from non-productive stations will only reduce costs if all Services withdraw from that location. Once again, a decision to lower recruiting costs and improve efficiency will not be rewarded.

Finally, since USAREC only has discretion over 30% of recruiting expenditures, any cost saving measures

implemented are overshadowed by the remaining 70% of recruiting expenditures.

The OMA2 accounts are normally the hardest hit during budget cuts. The advertising budget is a prime target since it does not incur high short run costs associated with compensation payments nor does it face congressionally mandated firing procedures like the civilian pay account. However, only cutting what is readily available instead of what is inefficient may lead to gross overall inefficiencies.

c. Data Accuracy

The third and final unit cost limitation we will discuss pertains to data accuracy. If managers are forced to choose between alternatives using unit cost as a decision criteria, it is important that true costs are used in calculating cost per accession. We noted that military pay is allocated to accessions based on a composite rate. This composite figure created by DoD is based on an average distribution of ranks throughout the Army. USAREC, however, possesses a rank structure that is much more senior as compared with an average Army unit. The result is that the estimated recruiting expenditure on military pay is understated by approximately 20%. While in most accounts variability in cost estimations would not have a significant

effect, this is not true of military pay since it is greater than half of the recruiting outlays.

E. CONCLUSIONS

In concept, unit costing has some beneficial points. On the positive side, unit costing measures serve to focus management attention on cost issues. However, in USAREC, using unit cost, as currently defined, falls short of providing management with the necessary incentive to cut costs in the most efficient manner. We found that the unit cost concept can be overly simplistic and should not be the basis for making resource decisions or cost comparisons at this point.

Under unit costing, when unit costs are compared between the Services' recruiting activities, pressure may be applied to conform to the lowest unit cost without examining the differences between Army recruiting and its sister Services. Even though we all seek high quality recruits, the cost of attracting these recruits will differ between the Services. This is the inherent danger of unit costing; pressure to reduce costs because of intra-Service comparisons without understanding why costs differ. For this reason it is essential that managers at all levels understand the limitations associated with using unit costing as management indicators.

The bottom line is that over emphasis on unit cost can lead to poor decision making. Unit cost is only capable of providing a one time snapshot of recruiting costs. As a measure of effectiveness it does not reflect the marginal cost not the life cycle cost of a recruit. If the unit cost is our sole measure of successful management, it would be easy to cut the cost per recruit by sacrificing our quality standards. However, the cost in the long run associated with higher attrition rates and reduced performance would be far greater than the immediate savings of a reduced recruiting unit cost. Just as the Army has committed to procure high reliability equipment to realize the savings associated with cheaper operational and sustainment costs, we must procure manpower in the same context. It is critical that we examine the long term effects of what we do. Unfortunately, the unit costing method is not capable of considering such long term ramifications. The use of life cycle cost as our measure of effectiveness would remove the temptation to go for the low bid for immediate cost savings and instead would measure success in terms of the big picture.

In summary, we have pointed out some of the limitations associated with using unit costing as a management measure of effectiveness. Managers must understand unit cost in its entirety when making resource allocation decisions. In

today's era of cost reduction it is critical that managers do not get consumed in lowering unit costs without understanding some of the drawbacks. Even though we must not lose sight of cost reductions, it remains far more important to use marginal costs as our guide while maximizing quality recruits.

Lastly, USAREC's managers do not have spending discretion for 70% of their expenditures, thus relieving them of resource decision consequences. In order to allocate resources efficiently, leaders must be accountable for their spending decisions.

IV. RECRUITER BONUS INCENTIVE MODEL

A. INTRODUCTION

As previously discussed, All-Voluntary Force enlistment is a function of many factors including recruiting effort, propensity towards military service, military wages, and economic conditions. This chapter will focus on recruiter effort and possible inefficiencies associated with the current quota oriented production system. As an alternative to the quota system, we will introduce a recruiter incentive program that maximizes market potential, rewards recruiters equitably in the long run despite inherent market differences, and provides important market information to allow management to make efficient resource decisions. Initially, we will review the current quota oriented production system.

B. CURRENT QUOTA SYSTEM

1. The Recruiter's Objective

Currently, Army recruiters are required to meet a monthly recruitment quota established by the headquarters. Their ability to meet their given quota directly affects their potential to stay in the recruiting business. The recruiter is considered successful if he meets his quota. However, should he miss a monthly quota his performance is

considered substandard by superiors, regardless of how many times he may have surpassed quotas in the past. In other words, a recruiter is only as good as his last win. Under this system, every recruiter has a standard by which his performance can be measured against, but achievement of which brings no extra compensation. The motivation to achieve a given quota is tied to enhanced promotion potential, which comes with doing any Army occupation well, or perhaps even a chance to win a recruiter of the year award. On the other hand, if a recruiter consistently fails to fulfil their quota they face receiving substandard efficiency reports or relief from their position; either of which effectively eliminates any promotion potential and may serve to end their career. Among the various Army career fields, recruiting has long had the reputation for being extremely harsh on recruiters unable to perform to established quotas. The relief rate among recruiters has historically averaged around 15%. Unlike other Army career paths, recruiters are given a nine month window to opt out if they feel unsuited to the rigorous duty requirements. Those deemed unsuitable for recruiting duty must return to the mainstream Army.

2. The Role of Management

The role of the headquarter's staff is to ensure that Army manpower requirements are met. In establishing

recruiter quotas, staff officers attempt to be as fair and equitable as possible given the tremendous variance that exists between market regions.

Headquarters personnel often see quota setting as an arduous task. Annual objectives are easy, but assigning quotas equitably among recruiters is difficult at best. Even if the original allocation looks fair at the beginning, regional markets and overall manpower requirements may change rapidly. We will now provide a brief overview of the current quota allocation from USAREC Headquarters down to the recruiters.

3. Overview of Current Quota Allocation

The number of required annual accessions is generated by the DCSPER and forwarded to USAREC. Additionally, DCSPER places conditions such as the percent of females and required quality marks on the accessions. As discussed in chapter II, quality marks are based on the ASVAB test scores and whether or not the recruit has a high school diploma. The lowest acceptable quality mark (category IV) has a ceiling (no more than) while the higher categories are given floors (at least this per cent).

Following is a review from chapter II of quality marks required for a recruiting year:

TABLE 4-1

PERCENTAGE	CATEGORY
≥ 95%	High School Diploma/Senior
≥ 67%	Test Score I-IIIA
≤ 2%	Test Score IV

Next, USAREC creates a quota matrix that facilitates the allocation of requirements among males, females, high school education level, and ASVAB test score percentiles. Each quota that a recruiter receives in the field will specify three characteristics of the potential applicant; that of sex, high school graduate or non graduate, and ASVAB percentile category (A or B). An example of USAREC's annual mission quota matrix is shown in Appendix C, Figure C-1.

The mission numbers developed by USAREC include a "padding" to compensate for the Delayed Entry Program (DEP) losses. The DEP is designed to have potential recruits sign a contract and report for training at a future date when training seats are available. The recruit may remain in the DEP for up to one year. However, USAREC has determined that the longer a high quality recruit remains in the DEP the more likely they will renege on their contract. This is due to the fact that quality people are more marketable and will

continue to hunt for the best job. Thus, the USAREC pads the DCSPER accession requirements.

The quota allocation is initially generated by USAREC with the aid of several computer based forecasting models. These models estimate regional market potential as a function of demographic make up, economic conditions and previous production levels. Although the final mission allocation is not an exact science, it uses USAREC's best judgement based on a dynamic market environment. Finally, USAREC establishes the quota mission for the recruiting brigades and recommends missions for the recruiting battalions and companies.

The b

Brigades in turn set the mission for the battalions and recommend missions down to the next two levels until the recruiter receives his mission from the recruiting station commander. Once again, we found that best efforts are made by the missioning chain to be fair in allocating quotas in order to equalize work efforts. However, our research indicates that the people who should know the market potential best, namely the recruiters, play a limited role in the quota allocation process.

4. The Effect of Quotas on Recruiter Work Effort

Current quota allocations have a distinct effect on recruiter work effort. As stated earlier, a recruiters

success is measured on his ability to meet an established quota. Each recruiter is paid a fixed salary based on his time in grade and service, regardless of his recruiting performance. Currently, there is no bonus pay associated with recruiting performance.

When compared with the severe penalty for missing quotas (i.e., loss of promotion potential, relief for cause), the reward for exceeding a quota (a good efficiency report) seems insignificant. We found that this situation has created an overly risk-averse working environment for recruiters. Most recruiters do what is expected, but lack the incentive to exceed established production quotas. Regardless of the number of quality applicants a recruiter brings in, he will only be deemed successful if he meets the exact specifications of the quota. (For example, only recruit a GMA[7], instead of seeking to maximize the true market potential by seeking all available quality recruits).

In addition, since the penalty for missing their quota is so great, recruiters have a strong incentive to induce the system to lower their quotas. Since historical performance is used to determine future quotas, a recruiter is encouraged to pace his recruiting effort. To do otherwise could result in a higher future quota and failure

[7]GMA refers to a male applicant that is a high school graduate and has scored in the I-IIIA categories on the ASVAB test.

to meet the quota. Both USAREC staff and recruiters confirmed the "holding recruits in their back pocket" behavior consistent with the existing incentive system. Under the current system, recruiter is not measured on how well he maximizes his market potential but rather on achieving a quota.

In this risk-averse environment, there is no incentive to surpass quotas from month to month regardless of a market's true potential. Unfortunately, in the process, valuable field information that could reduce aggregate recruiting costs is used only to help the recruiter in reducing his own quota. As a result, the biased information in turn unnecessarily lowers the perceived ability of recruiting and distorts managements view of actual regional market potential. Therefore, if the national aggregate total is to be met it can only be accomplished through higher recruiting expenditures, which might not actually be necessary if the original recruiting structure were more efficient.

5. Effect of Quotas on Recruiting Efficiency

Despite the inefficiencies associated with the current system of production based on quotas, USAREC consistently meets their production objectives and quality marks. One might even make the argument that if it isn't broken, don't fix it. However, in an era of cost scrutiny

and Service competition for austere budgets, every potential gain through efficiency becomes necessary in order to maintain a competitive advantage.

You will recall that in Chapter III we found little correlation between budgetary expenditures and accessions. In other words, when the quota was increased recruiters managed to meet this increased production without commensurate increase in costs. This is not to suggest that recruiters do not work hard. On the contrary, many recruiters work very hard to obtain that specific quota issued by their headquarters. Instead, this adjusted response to the quota system implies that recruiters as a whole lack the incentive to maximize their true market potential. The recruiters' high success rates under the current system actually corroborates our hypothesis that the quota system may result in some inefficiency.

Additionally, it is important to note that we cannot control the market's underlying probability distribution of recruit potential. Each market has its own unique recruit potential based on unemployment, demographic makeup, propensity toward military life and economic conditions. The more dispersed the probability distribution is, the more inefficient the quota system will become. For example, consider two market regions each with a mean of fourteen recruits and standard deviations of two and three

respectively. If we want to have a 95% probability of meeting a quota, the first region would have a quota of ten. The second region would have only a quota of eight since it is more disperse. Thus, the region with less dispersion will be more efficient.

To summarize the current incentive structure, we found that recruiters have no incentive to exceed an established quota. In addition, due to imperfect information, quotas are established at levels that frequently fall short of the true market potential. Based on the above findings, we will now introduce a hypothetical simulation of the current quota system to show its possible inefficiencies.

6. Simulation of Current Quota System

We used a Monte Carlo simulation since actual data on real market potential is not available. In our simulation we made two basic assumptions based on previous discussions.

First, quotas are established at a level that is less than the true market potential. We assume this to be appropriate since in the aggregate quotas are met with high probability.

Secondly, a recruiter will maximize his utility consistent with the established incentive structure. Given no incentive to exceed established quotas compiled with a

risk-averse environment, a recruiter will only produce up to the required quota. Any remaining market potential will therefore be left untapped or be held for the coming months.

Although the numbers we used are fictitious and may not mirror a specific recruiting market, the quantitative findings apply to any market meeting the above assumptions. In our simulation, we assumed that the recruiting station faced normal distribution with a mean of fourteen recruits and a standard deviation of three recruits. Additionally, we assumed the recruiting station received a mission quota of eight recruits.

One hundred random variables (RV's) representing the market potential were generated in groups of twenty and rounded down to the next whole integer. If the RV was greater than or equal to the quota it was assigned a value of one; if less than the quota, a value of zero.

Next, we added all the achieved quotas (the ones) and multiplied them by eight since a recruiter will only recruit to the quota level and then stop or save the additional contracts for the next month. Next we added the number of contracts that fell short of the quota for a total number of monthly contracts. Results of the simulation are provided in Appendix C, Figure C-2.

To summarize, we found that in the aggregate, the simulation identified a true market potential of 1103

recruits. That is, if recruiters possessed the incentive and capability to maximize the true market potential, they would have recruited 1103 quality applicants. However, given the nature of our current system in which recruiters receive their maximum rewards by meeting the quota, the recruiters would have obtained only 636 applicants. As compared with the number of applicants willing to enlist (true market potential), a quota system would have only obtained 58% efficiency. However, recruiters still achieved their quotas 98% of the time, clearly considered a success story by today's standards.

Additionally, we reduced the standard deviation of the distribution to two to study the effect on efficiency. As expected, a higher efficiency of 73% was achieved in this situation.

The simulation results confirm and numerically illustrate the possibilities of potential inefficiency in the current quota system. Although there is no perfect system to gain one hundred percent market efficiency, we think it is feasible to significantly enhance production levels given a proper incentive structure. By encouraging recruiters to reveal what the true market potential is and have recruiters maximize their production, we could eventually improve our efficiency.

C. THE BONUS INCENTIVE MODEL

In developing this model, we sought to identify overriding objectives that managers would desire given an ideal incentive structure. In his article Tie Salesman's Bonuses to Their Forecast for the Harvard Business Review, J. Gonik identified the following objectives:

1. Reward salesmen for absolute recruiting production.
2. Reward salesmen equitably even in tough market areas where a salesman will obtain a smaller market share.
3. Obtain current and reliable field information on market potential to make efficient resource decisions. (Gonik,p. 118)

1. Goals of the Bonus Incentive Mode

The bonus incentive model is an alternative to the current quota system that incorporates the above objectives. Highlights of the incentive model are as follows:

1. Provides an incentive for recruiters to surpass quotas and thereby maximize true market potential.
2. Rewards recruiters with monetary bonuses based on their work effort and their ability to forecast.
3. Rewards recruiters equitably despite inherent regional market differences in the long run.
4. Will provide in the long run USAREC headquarters with valuable market information that will allow for efficient future resource reallocation to the productive regions.
5. Help reduce the tendency for recruiters to delay or hold applicants for future months thereby improving market information to USAREC Headquarters.

6. Based on improved forecasting information, the bonus model will indirectly reduce staff workload and may minimize the variance in the mission process.

7. The model is adjustable to reflect changing Army accession requirements.

8. The model is capable of maintaining quality marks.

The key to this incentive structure is to link the recruiters market forecast to his actual production. We will assume that the bonus only applies to the recruitment of quality applicants. Under this system, the recruiter would be rewarded based on how accurate his forecast was compared to his production. The higher and more accurate the forecast, the higher the recruiter's reward will be. This reward incentive encourages recruiters to maximize their market potential which in turn provides USAREC with the accurate market information needed to reallocate resources to the more productive regions.

Table 4-2 shows a possible scenario of recruiter bonuses. The recruiter (or recruiting station) must forecast his performance over a specified time period (monthly or quarterly). After the actual results are tabulated at the end of the period the recruiter goes to the bonus table and aligns his actual production with his forecast to determine his bonus for that period. You will notice that the best earnings lie in the diagonal that goes down from left to right in the bonus table. In order to

maximize his bonus the recruiter must forecast exactly what he produces. The key for success is for the recruiter to be unbiased, which will also benefit management. Thus, we call the mechanism "truth revealing" since the recruiter has the incentive to reveal his true market potential. Over time a recruiter's forecast will come to reflect the unbiased estimate of applicants available in the market.

TABLE 4-2

RECRUITER BONUS INCENTIVES (DOLLARS)

		NUMBER FORECASTED BY RECRUITERS							
		10.0	11.0	12.0	13.0	14.0	15.0	16.0	17.0
	10.0	110.0	107.8	101.3	90.5	75.4	56.0	32.2	4.2
	11.0	153.2	155.3	153.2	146.7	135.9	120.8	101.3	77.6
ACTUAL	12.0	196.4	202.9	205.0	202.9	196.4	185.6	170.5	151.0
NUMBER	13.0	239.6	250.4	256.9	259.0	256.9	250.4	239.6	224.5
RECRUITED	14.0	282.8	297.9	308.7	315.2	317.3	315.2	308.7	297.9
	15.0	326.0	345.4	360.5	371.3	377.8	380.0	377.8	371.3
	16.0	369.2	392.9	412.4	427.5	438.3	444.8	446.9	444.8
	17.0	412.4	440.4	464.2	483.6	498.8	509.6	516.0	518.2
	AVERAGE =>	$251	$274	$283	$287	$287	$283	$274	$251

Under the bonus incentive program both the recruiters and management will benefit. From the recruiters perspective, he receives two important benefits:

1. A bonus tied to production and work effort.
2. In the long run, equitable compensation for their work effort compared with other recruiters.

Management benefits since the bonus incentive program will:

1. Realize true market potential.
2. Provide better information concerning market potential for a given region to facilitate efficient resource allocation.
3. Over time, close the gap between forecasts and actual results. Therefore a recruiter's forecast will come to reflect the true mean or expected value of the market which benefits management's accessions planning.

Therefore, even though total accuracy may never happen, the main objectives will have been met; enhanced production volume, reward based on performance, and improved field information.

2. Accounting for Regional Market Differences

As you will recall, one of management's objectives is to compensate recruiters equitably based on their work effort, despite inherent market differences. We have all heard the stories of recruiters in one region with lines of applicants waiting in his office while a recruiter in a different region has to struggle overtime to meet his

mission. Under the current system both recruiters are compensat equally.

Currently, recruiters perceive the quota system as unfair since they believe some recruiters must work harder than others to achieve their quotas. Any efforts to reduce the inequity by adjusting the bonus level could be inefficient. Therefore, in the long run, management could use the market potential information to reallocate resources more efficiently by relocating recruiters to the richer markets. The efficient reallocation of resources would result in marginal costs equalling marginal benefits where each dollar spent would buy the same number of quality recruits. The bonus incentive could reduce the level of inequity in the long run. The long run result would reward recruiters equitably as well.

3. Adjusting to Changes in Manpower Requirements

As with most aspects of DoD, the manpower procurement system is dynamic. Changes to recruit requirements are frequent. The bonus incentive model possesses the capability to adjust accordingly. For example, if actual production is ahead of requirements the bonus schedule can be adjusted to lower recruiter incentives thereby reducing the flow of applicants. By the same token, payment schedules may be increased to enhance recruiter effort to increase the number of applicants.

Using the bonus model in conjunction with historical production data, management could better estimate the cost associated with increased production levels (See Appendix C, Figure C-3).

For example, in our hypothetical situation, it would cost an additional $10,450 to obtain 124 more recruits or $640 per recruit. Although our numbers are unrealistically small, the model has the flexibility to better estimate additional costs associated with increased production levels.

4. Sustaining Recruit Quality Marks

Not all recruiting quality categories require the same work effort to obtain. For modeling purposes we assumed that the bonus schedule would only reward the recruitment of quality applicants (categories I-IIIA). Also, it is feasible to include a difficulty factor pertaining to quality marks in the bonus calculation. In other words, a recruiter would receive a bonus commensurate with which quality level he recruited. For example, one of the most difficult categories to recruit is category "A" females. High school graduates are more difficult to recruit than non-high school graduates. Therefore, due to the differences, more than one bonus incentive schedule may be published based on quality levels.

D. CONCLUSION

The current quota structure implies potential inefficiencies in its resource allocation. The bonus incentive program seeks a way to maximize market potential and provide management better information to allow for efficient reallocation of resources.

V. SUMMARY/CONCLUSIONS/RECOMMENDATIONS

A. SUMMARY

In this thesis we provided a brief overview of Army recruiting, examined the latest DoD management cost indicator known as unit costing, and proposed an alternative to mission quotas by introducing the concept of a recruiter bonus incentive program.

In chapter I we provided an introduction to the All Volunteer Force and unit costing in the military. We also established the scope and limitations of our study.

In chapter II we provided an overview of the recruiting process to include supply and demand, the reasons for quality standards, the applicant screening process, recruiting organizations, and measures of effectiveness.

In chapter III we provided an analysis of USAREC's unit cost procedures. We analyzed all the major cost drivers as they related to accessions. We also discussed shortcomings of using unit costs as a management tool in USAREC.

In chapter IV we analyzed potential inefficiencies built into a quota type procurement system. We then introduced a bonus incentive model designed to maximize market potential and facilitate management's efficient allocation of resources. We discussed how the model enhances recruiter

production and provides valuable market information to headquarters.

B. CONCLUSIONS

1. Unit Costing

Although the unit cost concept has served to focus more attention on cost issues, our conclusion is that unit costing, as currently stands, has severe limitations as a performance measure and policy tool. Our findings identified the following limitations with the unit cost concept:

a. Data Accuracy

Our study finds that the USAREC expenditure figure used in cost per recruit is significantly understated. The main reason for this underestimation is the Military Pay Account which is 50% of USAREC's expenditures. The study shows that the military pay for USAREC may actually be as much as 20% lower than the actual value.

b. Controlling Expenditures

One of the major goals in unit costing is to control or reduce spending. However, 70% of recruiting expenditures are charged against USAREC without their spending discretion. Managers do not have the responsibility for the majority of expenditures which

reduces the incentive for efficient use of resources. Moreover, any reductions they make in their controlled accounts are minimized due to the size of the uncontrolled accounts. As a result, management cuts for efficiency reasons do not significantly impact on unit cost figures, which is USAREC's measure of effectiveness.

c. Use as a Budget Allocation Tool

Unit costing is not an adequate tool for forecasting budget requirements since DoD's version of unit costing fails to recognize fixed costs. Unit costing implicitly assumes that all costs are variable and marginal costs and unit costs are equal. However, the majority of USAREC's costs are overhead and may not change in the short run, hence marginal costs and unit costs cannot be equal. Even in the long run where capacity can be adjusted, the marginal cost is not expected to be equal to unit cost. Therefore, the decisions based on unit cost are not expected to lead to efficient resource allocation.

d. Comparing Activities

Unit cost is not the best criterion to compare similar outputs without fully understanding the input makeup. By the nature of the jobs associated with the different Services' missions, some Services will have to expend more resources than others to attract America's quality youth.

e. Life Cycle Costs

Unit cost analysis is limited to a snap shot portrait in time. Over emphasis on unit cost may preclude management from considering the long term life cycle costs decisions which eventually will lower total costs. If the recruiting budget is reduced based solely on unit costs the Army may not be able to meet its quality goals. Short term savings associated with lower quality recruits may lead to higher long term expenditures since lower quality soldiers are associated with higher training, retention and job performance costs. In this respect we conclude that life cycle model studies are more beneficial.

2. Bonus Incentive Model

After studying the recruiting process we concluded that the quota system induces an overly risk-averse working environment which leads to potential recruiting inefficiencies. Since recruiters generally meet the recruiting mission on the aggregate level, we concluded that market potentials are not being fully realized. Additionally, if the missioning staff possessed better regional market environment information they could allocate resources more efficiently.

C. RECOMMENDATIONS

1. Unit Costing Measures

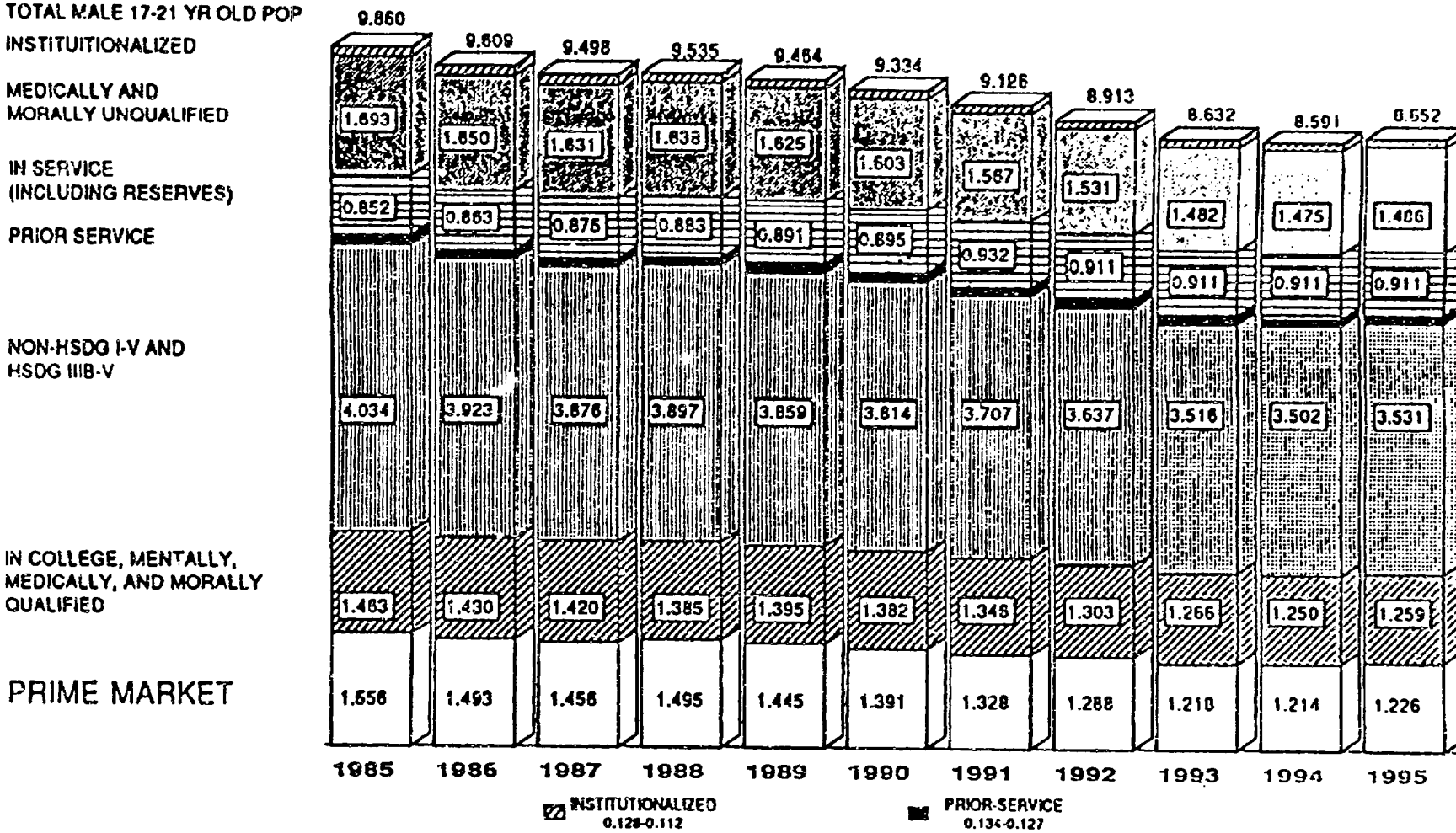
We recommend that caution be exercised when using unit cost information. An alternative to unit cost is marginal life cycle costs (LCC). The LCC allows management to make decisions that consider long term system impacts.

2. Recruiter Bonus Incentive Model

We recommend USAREC develop and explore a test bed recruiting region to implement our incentive model. Further study and research would be required to develop the regional market and recruiter work effort variables.

YOUTH POPULATION PRIME MARKET ESTIMATES

(IN MILLIONS)



PRIME MARKET CONSISTS OF MALE 17-21 YR OLDS, NPS, HSDG, TSC I-IIIA, MEDICALLY AND MORALLY QUALIFIED,NOT IN SERVICE, IN COLLEGE OR INSTITUTIONALI

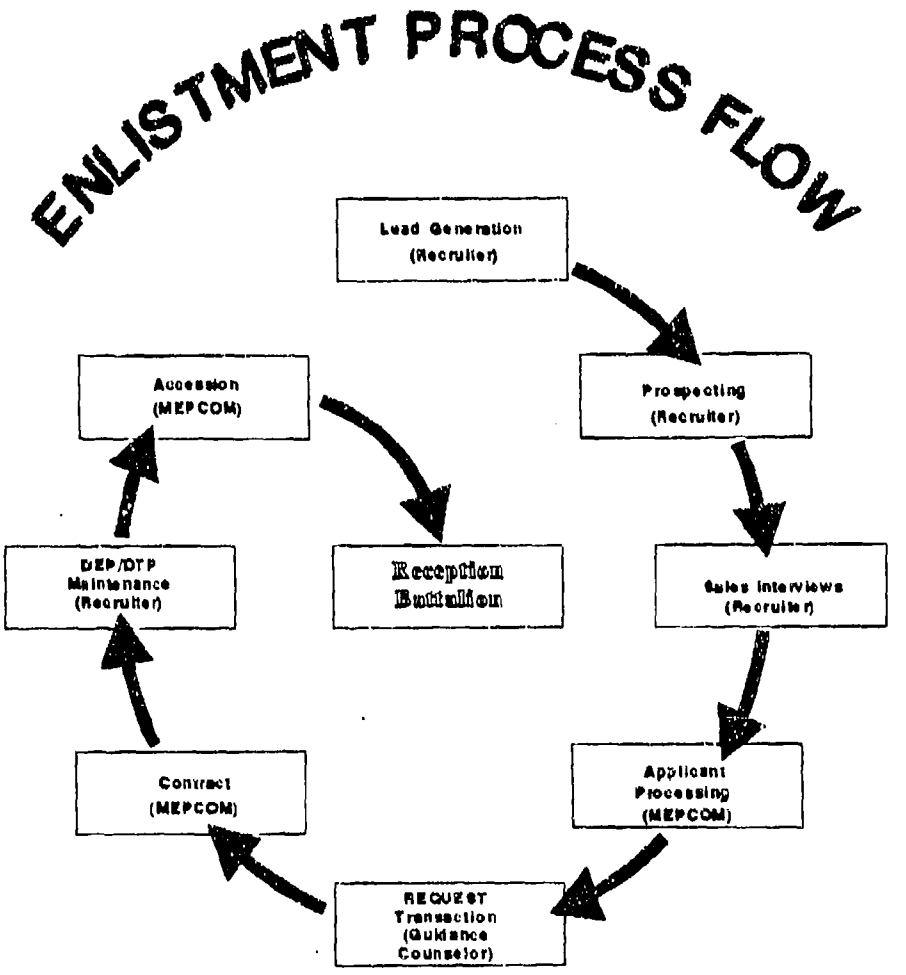
SOURCES: AR/CENSUS BUREAU, OASD, NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER, THE NATIONAL CENTER FOR EDUCATION STATISTICS AND TH VETERANS ADMINISTRATION.

Figure A-1

70

* Source: USAREC

K. BERLIANT/2
1 July 1989



* Source: USAREC Command Brief

FIGURE A-2

ENLISTMENT FLOW CHART

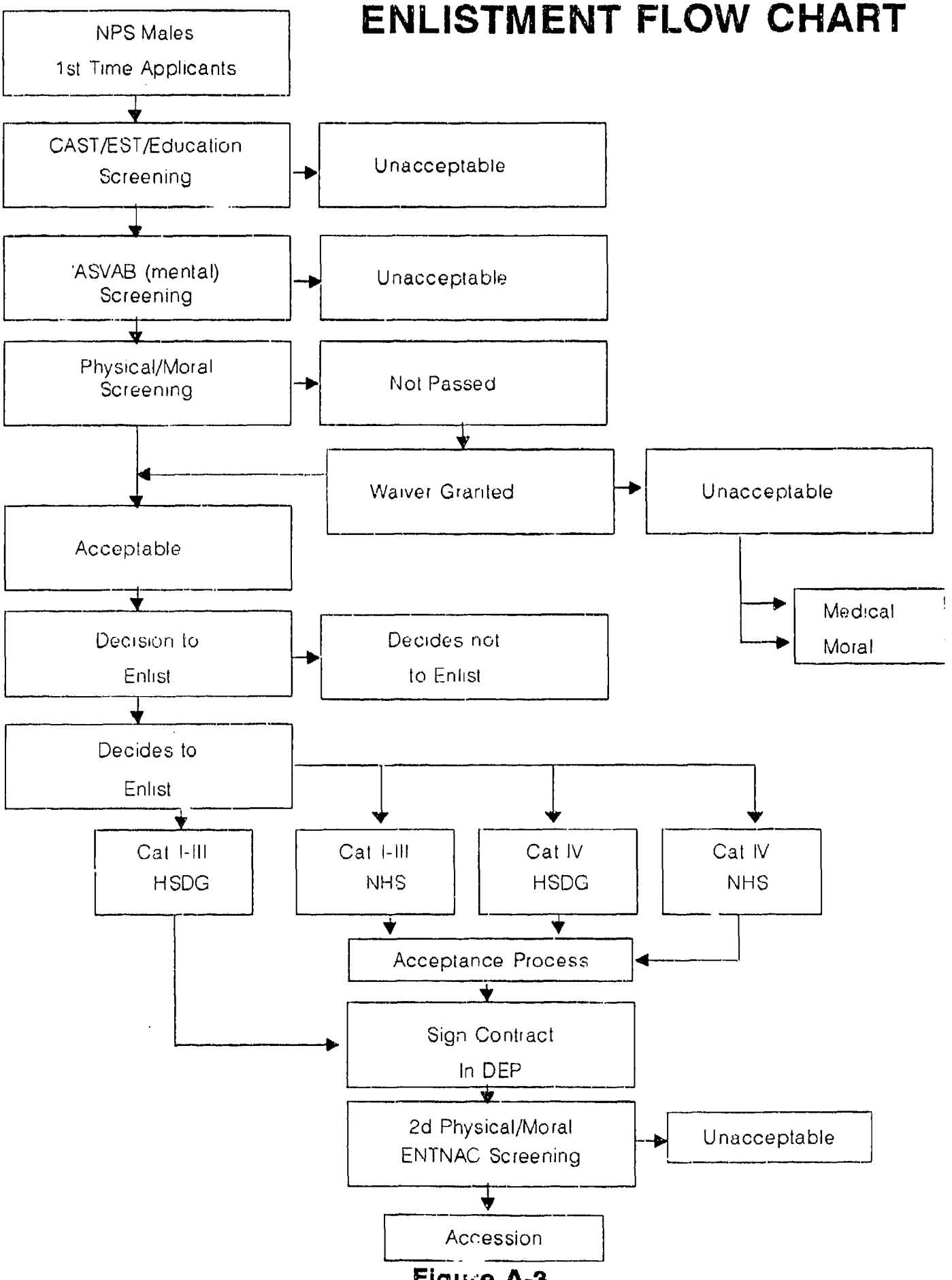
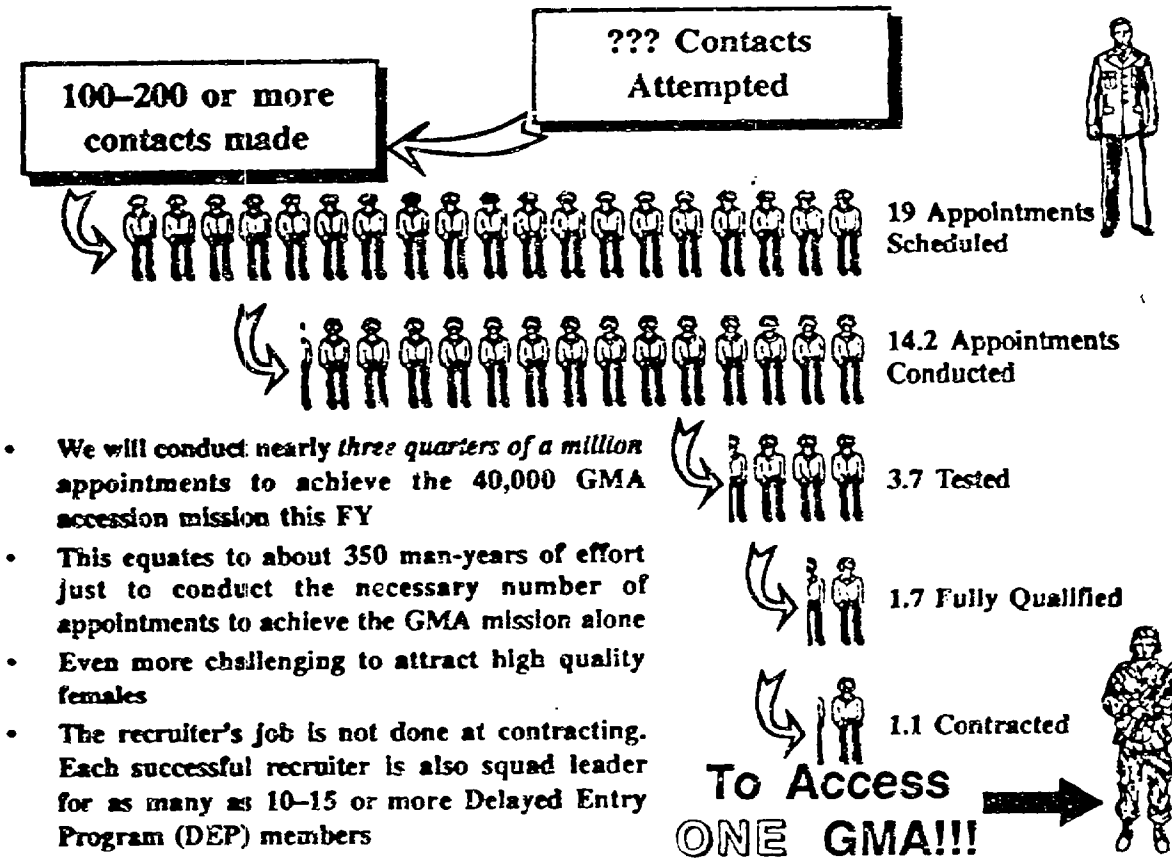


Figure A-3

THE MISSION - DIFFICULTY IN RECRUITING ONE GMA



- We will conduct nearly *three quarters of a million* appointments to achieve the 40,000 GMA accession mission this FY
- This equates to about 350 man-years of effort just to conduct the necessary number of appointments to achieve the GMA mission alone
- Even more challenging to attract high quality females
- The recruiter's job is not done at contracting. Each successful recruiter is also squad leader for as many as 10–15 or more Delayed Entry Program (DEP) members

Succeseful recruiters are pa
dectective, part doctor, part lawye
and part Dale Carnegie. A partial lis
of activities required to access
quality soldier include:

- School visits / career days / presentations
- Establish rapport with Centers Of Influence (COI)
- Area canvassing
- Work Lead Refinement Lists (LRL)
- Prepare school lists
- Work REACT cards
- Phone calls
- Red time
- House calls
- Prepare prospect data card
- Assist in administration of ASVAB tests
- Prequalify prospects
- Establish rapport
- Conduct interview
- Sales techniques
- JOIN presentation
- CAST test
- Police / court checks
- Prepare enlistment packet
- Schedule ASVAB
- Schedule physical
- Provide transportation for applicant
- DEP maintenance
- DEP functions

* Source: USAREC

Figure A-4

USAREC BIG TEN
(FY 80–93 FINAL)

>>>>>>>> ACTUAL DATA $K <<<<<<<< MPA	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
ARMY COLLEGE FUND	0	[illegible]	0	0	0	57,600	120,640	81,250	60,312	51,800	0	0	0	8,568
ENLISTMENT BONUS	39,700	55,700	90,300	103,800	93,400	96,500	105,948	66,500	39,400	42,300	58,900	27,333	10,832	11,049
MILITARY PAY	168,500	192,900	212,700	205,200	212,300	223,100	229,800	238,728	245,463	250,885	266,687	304,239	323,053	299,204
(TOTAL MPA)	208,200	248,600	303,000	309,000	305,700	377,500	456,388	386,478	345,175	344,985	325,587	331,572	333,885	318,819
OMA														
CIVILIAN PAY	20,429	22,870	25,660	28,496	27,380	28,756	28,883	28,993	30,420	32,074	34,099	32,541	33,148	33,401
ADVERTISING	53,754	52,781	60,783	62,517	61,981	75,415	76,883	70,789	63,809	63,099	64,013	44,458	39,179	32,766
RECRUITER AIDE SUPPORT	12,854	13,787	8,928	912	1,667	8,417	1,886	0	0	0	0	0	0	0
RECRUITER SUPPORT	46,667	63,379	72,192	70,982	86,304	91,207	83,945	94,974	91,335	97,206	92,521	81,226	83,486	73,815
TRAINING	3,283	4,416	4,300	4,404	3,911	4,940	4,785	3,936	4,617	5,176	4,998	4,373	4,373	5,053
COMMUNICATIONS	0	0	0	0	0	0	0	27,537	22,231	22,695	25,691	19,556	19,156	18,676
(SUBTOTAL USAREC OMA)	136,987	157,233	171,763	185,311	181,313	210,735	196,382	226,223	212,412	220,250	221,322	182,154	189,342	163,711
VEAP	0	0	0	0	0	0	0	0	0	0	0	0	0	29,673
(TOTAL USAREC OMA)	136,987	157,233	171,763	185,311	181,313	210,735	196,382	226,223	212,412	220,250	221,322	182,154	189,342	193,384
													(7967) BRAC	
COMMUNICATIONS	12,300	14,300	16,100	19,000	22,000	18,800	26,800	0	0	0	0	0	0	1,312
KEYSTONE (REQUEST – MSSR)	5,400	8,200	12,600	16,100	15,000	18,300	18,300	9,600	11,100	12,200	10,300	8,290	11,081	9,486
FACILITIES (OLEA)	13,900	19,000	20,400	22,100	24,900	25,900	27,400	29,800	30,900	32,400	35,695	36,575	36,232	36,216
(TOTAL OMA)	170,587	198,733	220,863	222,511	243,213	273,735	268,882	265,623	254,412	264,850	267,317	227,019	236,655	240,398
TOTAL BIG 10	378,787	447,333	523,863	531,311	548,913	651,235	725,270	652,101	599,587	609,835	592,904	558,591	572,340	559,217
TTL ENLIST/ACCESSION MISSION	173,188	137,916	130,198	145,337	142,318	125,445	135,528	133,000	115,229	120,558	89,819	78,243	77,563	77,563
GROSS COST PER ACCESSION	2,187.1	3,243.5	4,023.6	3,655.7	3,857.0	5,191.4	5,351.4	4,903.0	5,203.8	5,058.4	6,615.8	7,139.2	7,377.1	7,209.8

Figure B-1

USAREC BIG TEN (FY 80–93 CONSTANT)

>>>>>> FY93 CONSTANT $M <<<<<<< MPA	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
ARMY COLLEGE FUND	0.0	0.0	0.0	0.0	0.0	74.9	151.3	99.4	70.9	59.0	0.0	0.0	0.0	8.6
ENLISTMENT BONUS	84.4	103.9	144.9	159.0	136.7	125.9	132.9	81.3	46.3	48.2	66.3	27.3	10.6	11.0
MILITARY PAY	326.6	332.6	335.8	308.3	306.2	300.5	300.1	300.5	295.2	289.4	299.9	327.9	336.8	292.4
(TOTAL MPA)	411.0	436.5	480.7	467.3	442.9	501.3	584.3	481.2	412.4	396.5	366.3	355.2	347.4	312.0
OMA														
CIVILIAN PAY	37.4	38.6	42.2	41.3	41.0	41.7	40.9	38.7	38.1	37.9	38.3	35.1	34.4	32.8
ADVERTISING	93.3	82.8	88.6	87.6	83.7	98.4	97.6	87.5	76.5	72.7	70.8	47.4	39.2	26.6
RECRUITER AIDE SUPPORT	22.4	21.6	12.8	1.3	2.3	11.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RECRUITER SUPPORT	84.4	99.4	105.2	99.5	116.6	121.7	106.5	117.4	109.6	112.0	102.4	86.5	93.5	72.9
TRAINING	5.7	6.9	6.3	6.2	5.3	6.4	6.1	4.6	5.5	6.0	5.5	4.7	4.4	5.1
COMMUNICATIONS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.0	26.6	26.1	28.4	20.9	19.2	19.6
(SUBTOTAL USAREC OMA)	243.2	249.3	255.1	235.7	248.9	279.1	253.6	282.5	256.5	254.7	245.5	194.6	190.7	157.0
VEAP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.4
(TOTAL USAREC OMA)	243.2	249.3	255.1	235.7	248.9	279.1	253.6	282.5	256.5	254.7	245.5	194.6	190.7	188.4
COMMUNICATIONS	21.3	22.4	23.5	26.6	29.7	24.5	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KEYSTONE (REQUEST–MS5B)	9.4	12.9	18.4	22.6	20.2	23.9	23.2	11.9	13.3	14.1	11.4	8.6	11.1	9.4
FACILITIES (QLEA)	24.1	29.8	29.7	31.0	33.6	33.8	34.8	36.8	37.1	37.3	39.5	39.0	39.5	36.2
(TOTAL OMA)	298.0	314.3	326.6	315.9	332.4	361.3	345.7	331.2	306.9	306.0	296.4	242.4	241.2	234.0
TOTAL BIG 10	709.0	750.8	807.3	783.2	775.3	862.6	930.0	812.4	719.3	702.5	662.7	597.6	588.6	546.0
ACCESSION MISSION	173,188	137,916	130,198	145,337	142,316	125,445	135,528	133,000	115,220	120,558	89,619	78,243	77,583	76,000
GROSS ACTUAL COST PER ACCES	4,093.7	5,444.1	6,200.6	5,388.9	5,447.6	6,876.7	6,852.1	6,108.6	6,243.0	5,827.4	7,394.4	7,637.7	7,587.1	7,184.2

Figure B-2

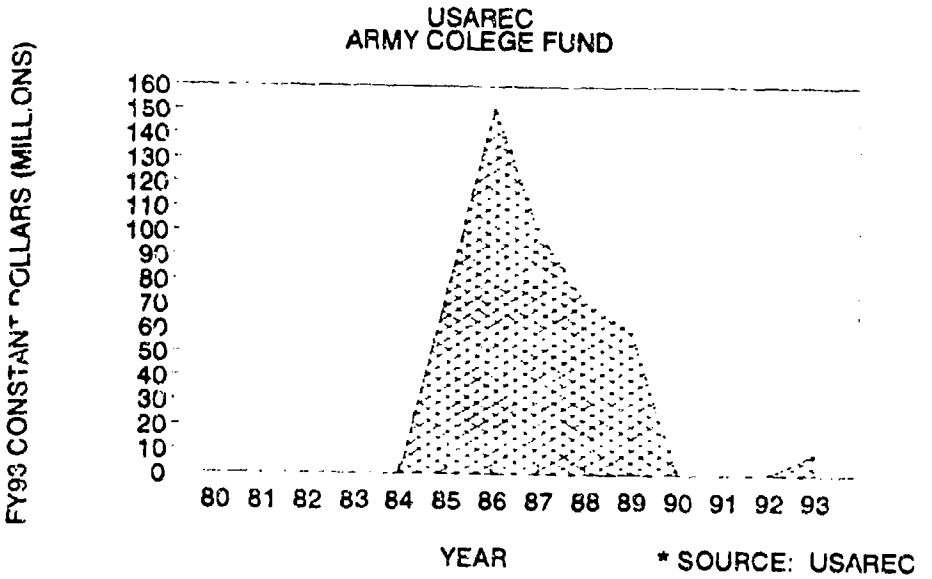


FIGURE B-3

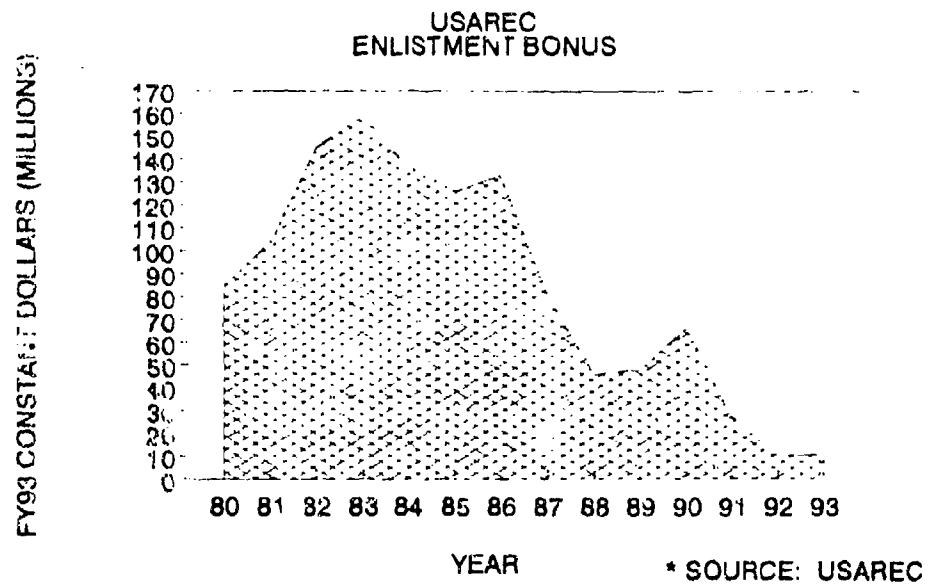


FIGURE B-4

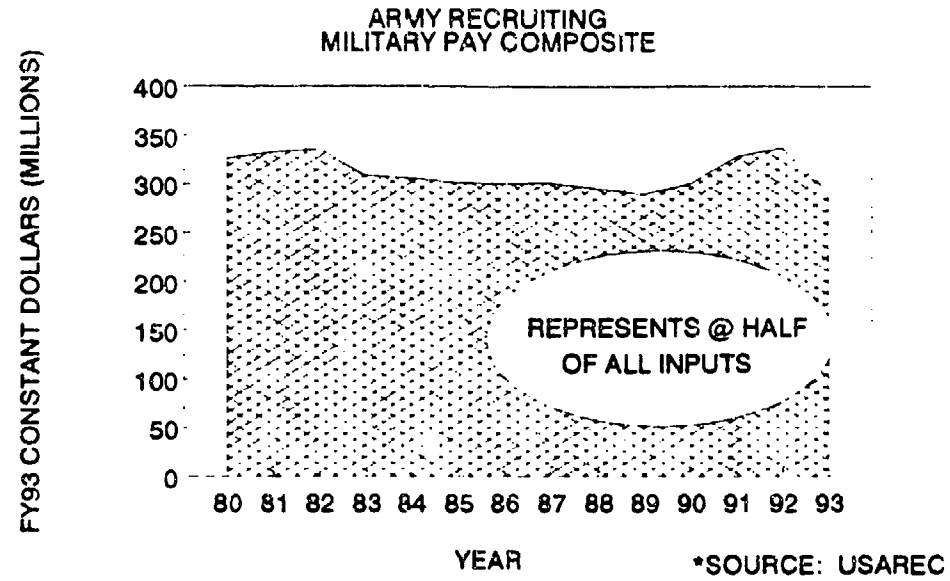


FIGURE B-5

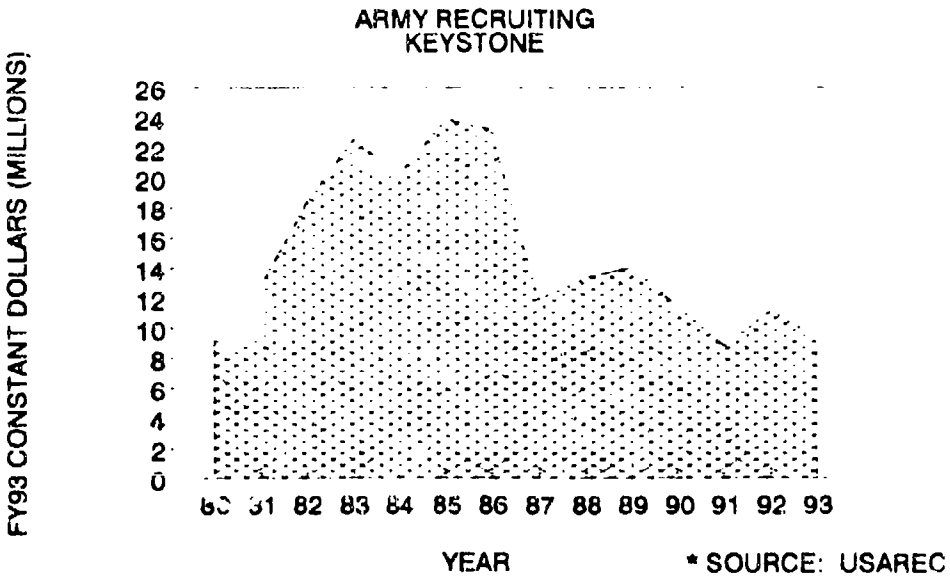


FIGURE B-6

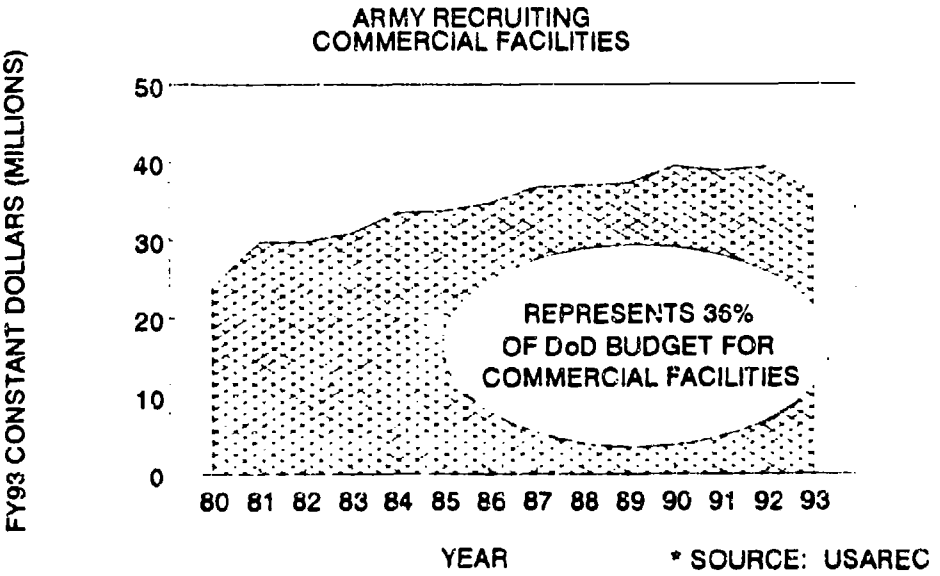


FIGURE B-7

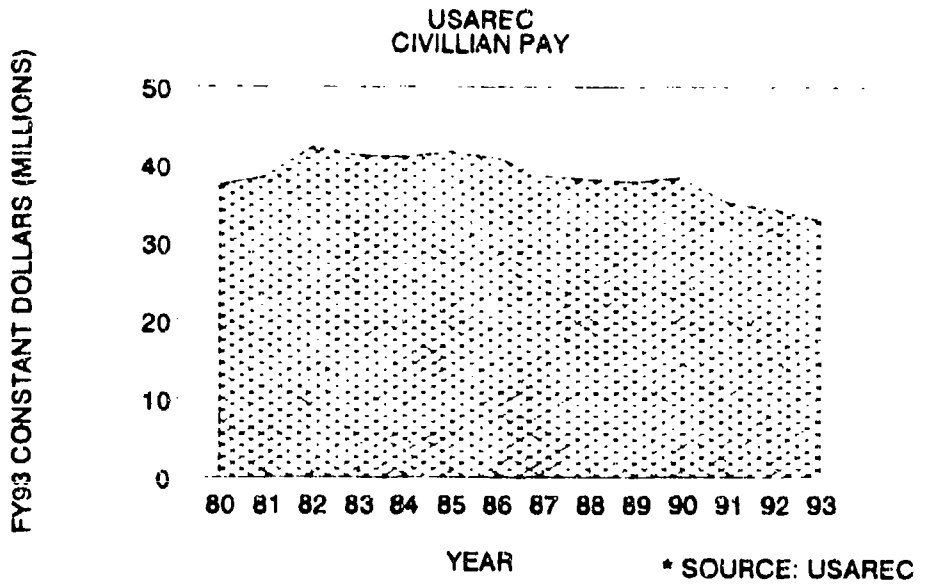


FIGURE B-8

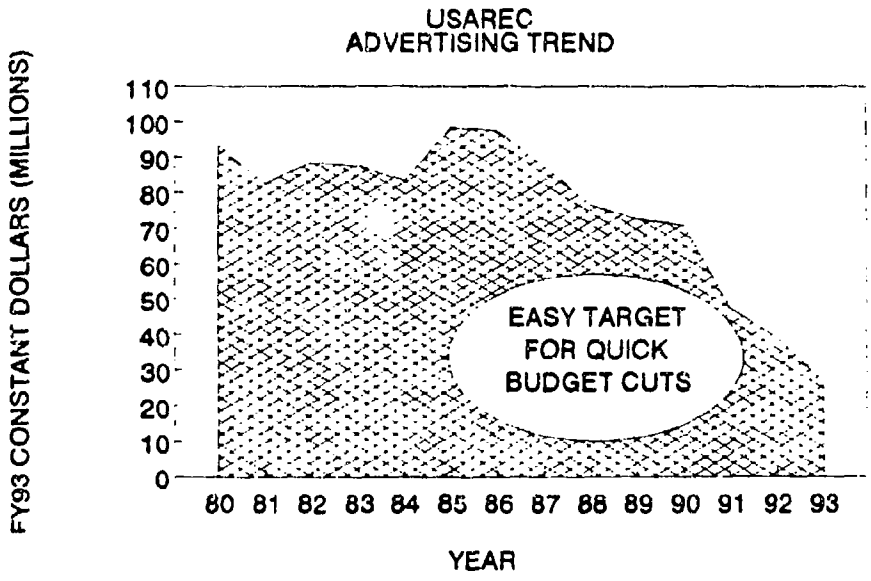


FIGURE B–9

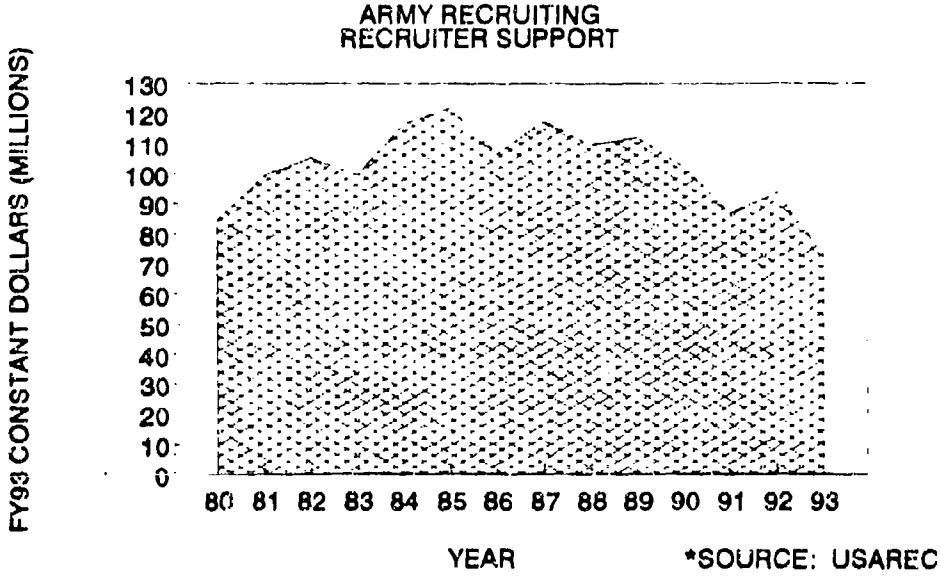


FIGURE B–10

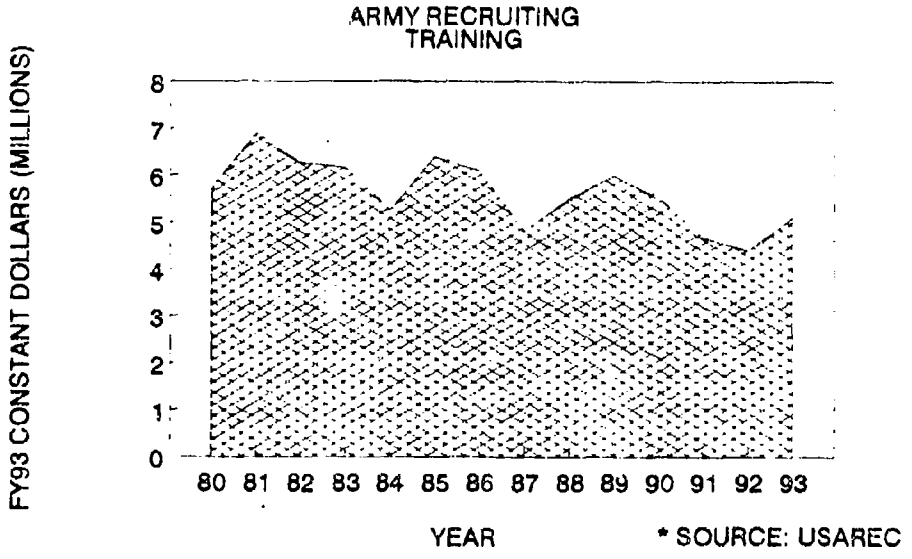


FIGURE B–11

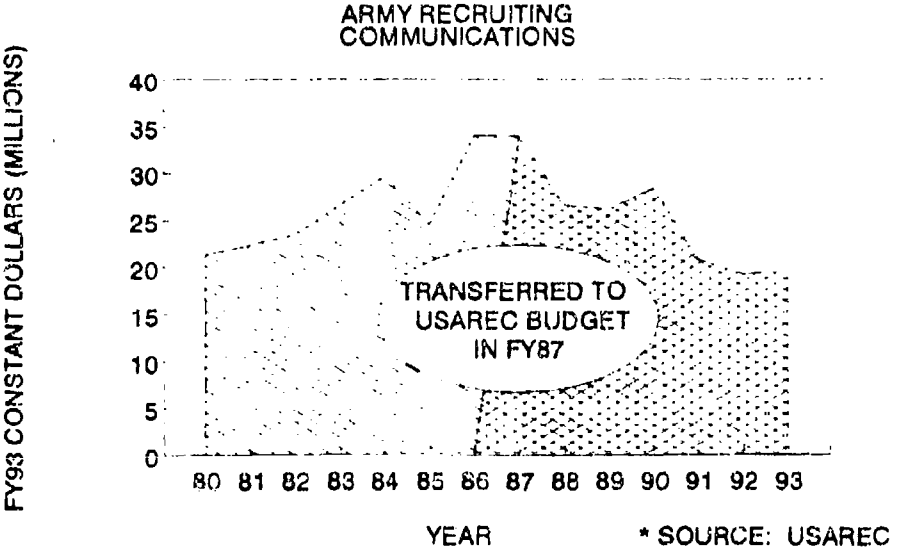


FIGURE B–12

HISTORICAL CHART OF RA ACCESSION DATA

MISSION CATEGORY	FY80	FY81	FY82	FY83	FY84	FY85	FY86	FY87	FY88	FY89	FY90
GMA	21364	28863	39152	49696	52166	53755	57573	58439	52025	51100	43007
GMB	9564	17876	23931	30980	33301	28684	37804	30344	26857	25653	23171
GM4	35618	30790	25293	19050	16888	10181	4696	4701	4644	7602	1551
GM	66546	77529	88376	99726	102355	92620	100073	93484	83526	84355	67729
NHMA	11796	6539	8924	11270	9963	11067	11657	10665	7713	8646	3923
NHMB	12789	11919	7107	4922	2185	2	2	3	0	2533	91
NHM4	44792	3626	751	297	8	0	0	0	0	0	0
NHM	69377	22084	16782	16489	12156	11069	11659	10668	7713	11179	4014
NPM	135923	99613	105158	116215	114511	103689	111732	104152	91239	95534	71743
GFA	5513	6047	8602	11121	11158	10135	10980	11302	9541	9952	9506
GFB	4686	5427	5838	5012	5606	5298	4428	5039	4648	6076	3105
GF4	9118	5727	755	383	427	0	0	0	0	0	0
GF	19317	17201	15195	16516	17191	15433	15408	16341	14189	16028	12611
NHFA	733	444	0	0	0	0	0	0	0	129	0
NHFB	921	550	0	0	0	0	0	0	0	0	0
NHF4	1246	107	0	0	0	0	0	0	0	0	0
NHF	2900	1101	0	0	0	0	0	0	0	129	0
NPF	22217	18302	15195	16516	17191	15433	15408	16341	14189	16157	12611
NP	158140	117915	120353	132731	131702	119122	127140	120493	105428	111691	84354
PS	15048	20001	9845	12606	10614	6323	8388	12507	9692	8867	5265
TOTAL ENLISTMENT	173188	137916	130198	145337	142316	125445	135528	133000	115120	120558	89619

NP QUALITY MARKS											
% GRAD	54	80	86	88	91	91	91	93	93	90	95
% NPA	25	36	47	54	56	63	63	66	66	63	67
% NP4	57	34	22	16	13	9	4	4	4	7	2

*SOURCE: USAREC

ACRONYM KEY

G=GRADUATE/SENIOR
NH=NON HIGH SCHOOL GRAD
M=MALE

F=FEMALE
NP=NON PRIOR SERVICE
PS=PRIOR SERVICE

A: >=50% TEST SCORE
B: 31-49% TEST SCORE
4: <=30% TEST SCORE

FIGURE C-1

SIMULATION OF TRUE RECRUITING MARKET POTENTIAL

[Normal Distribution with Mean = 14, standard deviation = 3. Quota = 8.]

	rv1	integer	>= quota	actual	rv2	integer	>= quota	actual	rv3	integer	>= quota	actual	rv4	integer	>= quota	actual
1	14.0	14	1	8	14.5	14	1	8	17.1	17	1	8	14.3	14	1	8
2	12.7	12	1	8	16.5	16	1	8	19.2	19	1	8	10.7	10	1	8
3	10.5	10	1	8	14.6	14	1	8	13.3	13	1	8	8.8	8	1	8
4	8.9	8	1	8	13.9	13	1	8	16.8	16	1	8	14.8	14	1	8
5	10.5	10	1	8	15.2	15	1	8	10.9	10	1	8	11.6	11	1	8
6	10.4	10	1	8	12.9	12	1	8	13.1	13	1	8	16.5	16	1	8
7	14.9	14	1	8	13.8	13	1	8	15.2	15	1	8	16.1	16	1	8
8	15.8	15	1	8	13.6	13	1	8	16.9	16	1	8	17.7	17	1	8
9	11.3	11	1	8	12.7	12	1	8	14.7	14	1	8	17.4	17	1	8
10	16.6	16	1	8	11.3	11	1	8	17.7	17	1	8	9.8	9	1	8
11	18.9	18	1	8	12.8	12	1	8	12.0	12	1	8	15.4	15	1	8
12	14.8	14	1	8	18.5	18	1	8	12.9	12	1	8	13.0	12	1	8
13	10.7	10	1	8	10.6	10	1	8	20.2	20	1	8	8.6	8	1	8
14	14.3	14	1	8	15.9	15	1	8	16.3	16	1	8	13.1	13	1	8
15	12.2	12	1	8	10.4	10	1	8	17.9	17	1	8	12.2	12	1	8
16	11.6	11	1	8	10.2	10	1	8	16.6	16	1	8	15.7	15	1	8
17	14.8	14	1	8	12.2	12	1	8	15.8	15	1	8	13.0	13	1	8
18	16.7	16	1	8	12.7	12	1	8	16.2	16	1	8	13.0	13	1	8
19	14.5	14	1	8	8.6	8	1	8	14.0	13	1	8	8.7	8	1	8
20	8.5	8	1	8	15.5	15	1	8	10.1	10	1	8	14.0	13	1	8
Σsum=>	252.6	251	20	160	266.2	255	20	160	307.0	297	20	160	264.3	254	20	160
avg=>	13.1	12.55			13.3	12.8			15.3	14.9			13.2	12.7		
	% quota met=>		100.00%		% quota met=>		100.00%		% quota met=>		100.00%		% quota met=>		100.00%	
	# recruits=>			160	# recruits=>			160	# recruits=>			160	# recruits=>			160
	market potential=>			251	market potential=>			255	market potential=>			297	market potential=>			254
	efficiency rate =>			63.75%	efficiency rate =>			62.75%	efficiency rate =>			53.87%	efficiency rate =>			62.99%

% QUOTA MET =>	100.00%
ACTUAL SUPPLY :	1057
# RECRUITED =>	640
RECRUITING EFFICIENCY :	60.55%

FIGURE C-2

Figure C-2

ADJUSTING BONUSES TO MEET CHANGING MANPOWER REQUIREMENTS									ASSOCIATED COST	
[When d becomes 0.46]								0.46		
	Sample Market Region									
	1	2	3	4	5	6	7	8	# Recruits	Cost
Market Characteristics (M)	4.08	4.28	4.47	4.66	4.83	5.00	5.16	5.32		
Work Effort (W)	35.91	43.48	51.73	61.11	70.52	80.99	91.86	103.80		
Average # Recruits (mu)	9.99	10.99	11.99	13.03	14.00	15.00	15.97	16.98	108	
Payment Scheme (a)	$109	$155	$204	$261	$317	$380	$445	$517		$2,388
Payment Scheme (b)	$43	$47	$52	$56	$60	$65	$69	$73		
[When d becomes 0.35]								0.35		
	Sample Market Region									
	1	2	3	4	5	6	7	8		
Market Characteristics (M)	4.08	4.28	4.47	4.66	4.83	5.00	5.16	5.32		
Work Effort (W)	62.84	76.09	90.53	106.93	123.41	141.72	160.75	181.64		
Average # Recruits (mu)	11.49	12.64	13.79	14.99	16.10	17.25	18.37	19.53	124	
Payment Scheme (a)	$179	$239	$305	$379	$454	$537	$623	$718		$3,433
Payment Scheme (b)	$50	$55	$60	$65	$70	$75	$79	$84		

delta =>	16	$1,045
Additional Cost per Recruit=>		**$64**

When manpower requirements are greater than the current work effort produces (or vice verse), we increase the bonus incentive by manipulating D, which in turn enhances the recruiters' work efforts. These tables show the cost associated with recruiting additional enlistees given various regional ("M") differences.

FIGURE C–3

Figure C-3

APPENDIX D

THE OSBAND-REICHELSTEIN MODEL

This Appendix is based on K.L. Terasawa's Horse-Tale, dated 9 May 93.

The Osband-Reichelstein model is a truth revealing mechanism used in government contracting. The model is based on an initial payment plus a bonus (penalty) for cost savings (or overruns). In order for the model to work, the government must be able to identify the true costs after the project has been completed.

The contractors final payment will be a function of an initial payment, α, plus an adjustment, β multiplied by the difference between the original bid cost, β, and the actual costs,C, giving us:

$$\text{Payment} = \alpha + \beta(B - C) \qquad \text{(eq 1)}$$

As the bid cost, B, increases, the initial payment, α, will decrease, thereby providing an incentive for bidding lower. The adjustment factor, β, is a positive number to reward cost savings and reduce final payment in the case of cost overruns. Additionally, β will increase as the bid cost, B, decreases, thereby reducing an incentive to bid below their true cost.

For example, a project will cost between $3,000,000 and $3,400,000. The contractor faces the following payment schedule (in millions):

TABLE D-1

B	α	β
3.0	5.49	4.83
3.1	5.01	4.35
3.2	4.59	3.93
3.3	4.20	3.54
3.4	3.85	3.19

If the contractors true costs are $3,100,000, and he bid $3,100,000, his payment and profit will be:

Payment = 5.01 + 4.35(3.1 - 3.1) = $5,010,000

Profit = $5,010,000 - $3,100,000 = $1,910,000

However, bidding higher or lower would have reduced the contractors profit:

Lower bid:

Payment = 5.49 + 4.83 (3.0 - 3.1) = $5,007,000

Profit = $5,007,000 - $3,100,000 = $1,907,000

Higher bid:

Payment = 4.59 + 3.93 (3.2 - 3.1) = $4,983,000

Profit = $4,983,000 - $3,100,000 = $1,883,000

The mechanism induces the profit-maximizing contractor to report his true cost of $3,100,000, hence, the mechanism is truth revealing.

To determine the values of α and β, we must first start with a payment function. Since both α and β are dependant on B we have:

$$\text{Payment} = \alpha(B) + \beta(B) * (B - C) \qquad \text{(eq 2)}$$

Giving us a profit function of:

$$\pi = \alpha(B) + \beta(B) * (B - C) - C \qquad \text{(eq 3)}$$

To maximize the contractor's profit we have:

$$\partial\pi/\partial B = \alpha' + \beta'(B - C) + \beta = 0 \qquad \text{(eq 4)}$$

$$\partial^2\pi/\partial B^2 = \alpha'' + \beta''(B - C) + \beta' + \beta' < 0 \qquad \text{(eq 5)}$$

To be truth revealing B must equal C and equation 4 becomes:

$$\alpha' + \beta = 0 \quad \text{or} \quad -\beta = \alpha' \qquad \text{(eq 6)}$$

By differentiating equation 6 again with respect to B, we have:

$$\alpha'' = \beta' \qquad \text{(eq 7)}$$

Substituting equation 7 into equation 5, we have:

$$\alpha'' + 2\beta' = \alpha'' - 2\alpha'' = -\alpha'' < 0 \quad \text{or} \quad \alpha'' > 0$$

Giving us two conditions:

1. $-\beta = \alpha'$
2. $\alpha'' > 0$

Therefore, as long as the two conditions are met and the government can observe the true cost of the project after the production, the Osband-Reichelstein model will be truth

revealing before the production. (Terasawa, May, 1993, pp. 1-6).

APPENDIX E

BONUS INCENTIVE MODEL DERIVATIONS

This entire Appendix benefited from K.L. Terasawa's Bonus Incentive System Applied to Recruiting, dated August, 1993.

The development of the bonus incentive program is based on the Osband-Reichelstein model (see Appendix A). Similar to the Osband-Reichelstein model, the program is also a truth revealing mechanism based on bids (forecasts) and actual costs (accessions).

To derive the payment schedules, we must first begin with the recruiter's utility, U, which is a function of his payment, Y, and his work effort, W, multiplied by a constant, c, that converts effort-level into monetary measure. Let:

$$U = U(Y, W) = Y - cW \qquad \text{(eq 1)}$$

The payment, Y, is a function of both the forecast, F, and the actual accessions, P, and can be expressed as:

$$Y = \alpha(F) + \beta(F) * (P - F) \qquad \text{(eq 2)}$$

The α and β are functions of the forecast and must exhibit properties to ensure the recruiter's forecast will match the unbiased estimate of expected accessions, "E(P)", written as μ. We have:

$$F = E(P) = \mu \qquad \text{(eq 3)}$$

The expected accessions, μ, is a function of the recruiter's work effort, W, given the market environment, M. We assume that:

$$\mu = M * W^k \qquad \text{(eq 4)}$$

The market environment, M, must be positive since it represents how accession-rich an area is. An increase in M represents an increase in accessions opportunity for the given market. The parameter k must be between zero and one. The k ensures a condition of diminishing returns in the work effort. A direct linear relationship between work effort and accessions is impossible since at some point, no matter how hard the recruiter works, he cannot produce more accessions.

Therefore, the recruiter's expected utility becomes:

$$U = E(U) = \alpha + \beta * (M * W^k - F) - cW \qquad \text{(eq 5)}$$

Next, we want to maximize the recruiter's expected utility, U, with respect to his forecast and work effort. Since we want the mechanism to be truth revealing P must equal F, which means we must have:

$M * W^k - F = 0$ as a side condition.

The first partial derivatives of U with respect to F and W are:

$$\partial U/\partial F = \alpha' + \beta' * (M * W^k - F) - \beta = 0$$

$$\text{Simplified: } \alpha' = \beta \qquad \text{(eq 6)}$$

$$\partial U/\partial W = \beta * (M * k * W^{k-1}) - c = 0$$

Simplified: $W = (\beta Mk/c)^{1/(1-k)}$ (eq 7)

The second derivatives:

$$\partial^2 U/\partial F^2 = \alpha'' + \beta'' * (M * W^k - F) - 2\beta' < 0$$

Simplified: $-\alpha'' - 2\beta' < 0$

From equation 6: $\alpha' = \beta$ and $\alpha'' = \beta'$

Giving us: $-\alpha'' < 0$ (eq 8)

$$\partial^2 U/\partial W^2 = \beta * (k-1)(M * k * W^{k-2}) < 0$$

Simplified: $\alpha' * k(k-1) * \mu/W^2 < 0$ (eq 9)

$$\partial^2 U/\partial W \partial F = \beta' * M * k * W^{k-1} = \alpha'' * M * \mu/W \quad \text{(eq 10)}$$

Giving us the following determinant which must be positive:

$$\begin{vmatrix} -\alpha'' & \alpha'' M * \mu/W \\ \alpha'' M * \mu/W & \alpha' k(k-1) \mu/W^2 \end{vmatrix}$$

Therefore:

$$\alpha'' < a'k(1-k)/m^2\mu \quad \text{(eq 11)}$$

This means that if our function for the base bonus payment, α, is:

$$\alpha = F^2/D - S \quad \text{(eq 12)}$$

where D represents a management tool used to increase or decrease the base payment when environmental charges such as an increase or decrease in accession totals, unemployment or economic conditions warrant. By decreasing the D value,

management increases the bonus. For example: if USAREC's total accessions goal increases for the year they can lower the D, increase the bonus and provide more incentive to the recruiters to increase their production. The variable S is a management tool to determining the size of the base payment.

Therefore, our condition will be:

$(n - 1) < (1 - k)/k$ or $kn < 1$ giving $k < 1/n$

In our example, we selected two for the value of n and .25 for the value of k which satisfies the above condition. Additionally, since the compensation variant, β, is equal to the first derivative of α, our example becomes:

$$\beta = 2F/D \qquad \text{(eq 13)}$$

Additionally, our work effort function, "W", based on equation 7 becomes:

$$W = (2M^2k/cD)^{1/(1-2k)} \qquad \text{(eq 14)}$$

From these derivatives and the resulting functions we developed the bonus incentive tables based on the recruiter's work effort, market environment and base payment. (Terasawa, August 1993)

APPENDIX G

ACRONYMS

ASVAB - Armed Services Vocational Aptitude Battery

AVF - All Volunteer Force

CAST - Computerized Adaptive Screening Test

CAT - Category

DCSPER - Deputy Chief of Staff for Personnel

DEP - Delayed Entry Program

DLA - Defense Logistics Agency

DoD - Department of Defense

ENTNAC - Entrance National Agency Check

EST - Enlisted Screening Test

FC - Fixed Cost

FY - Fiscal Year

GMA - Graduate Male Category A

HSDG - High School Diploma Graduate

LCC - Life Cycle Cost

MEPS - Military Entrance Processing Station

MOS - Military Occupational Specialty

MPA - Military Personnel Army

NHS - Non-High School Graduate

NPS - Non-Prior Service

OMA - Operations and Maintenance Army

OSD - Office of the Secretary of Defense

PS - Prior Service

RA - Regular Army

RV - Random Variable

TDA - Table of Distribution and Allowances

TRADOC - Training and Doctrine Command

TSC - Test Score Category

USAREC - United States Army Recruiting Command

VEAP - Veterans Educational Assistance Program

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